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ABSTRACT

This problem deck is designed for use after having covered the material in an accompanying skills booklet. It provides for further use of the skills with problems involving four skills at five levels of difficulty. The four skills involve using guesses as a strategy in solving computation problems, two-step problems, situations that require diagrams, and measurement problems using estimation. Over 125 problems are presented. (MP)

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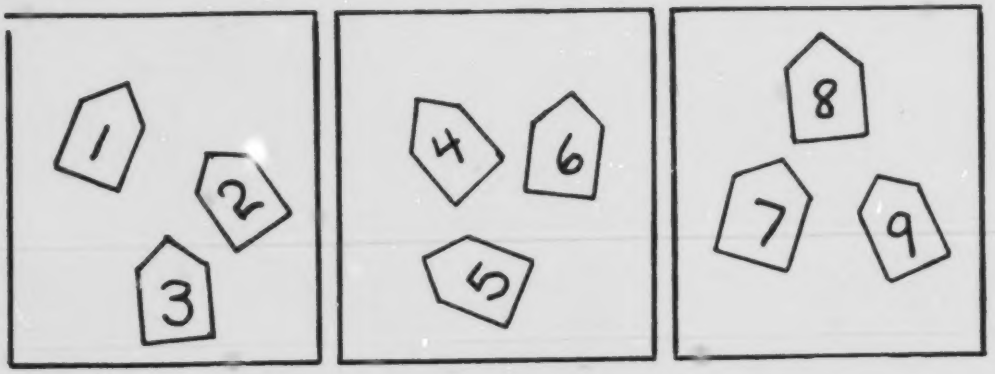
USING GUESSES

SE 026 923

1BC6



Move one tag to another box so each box has a sum of 15. Draw a picture to show your solution.

2BC6

There are about 50,000 admissions to a football game. If the total gate receipts were about $400,000, what is the cost of each ticket?

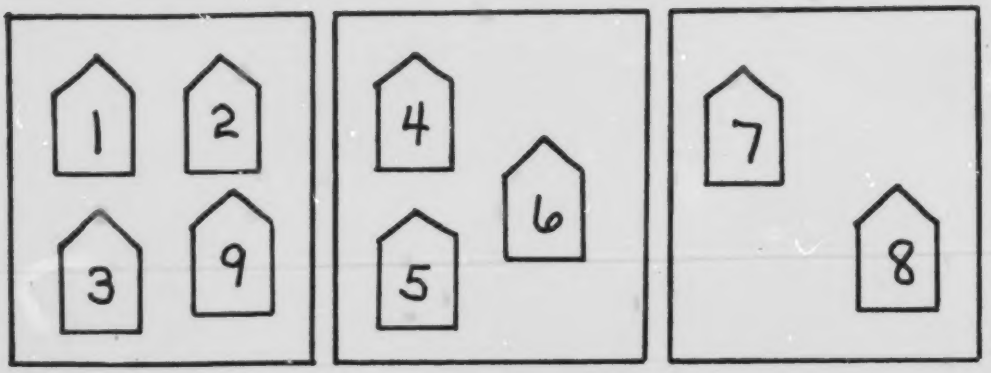
One of these will help you estimate.

50,000 x 5.00 50,000 x 6.00

50,000 x 7.00 50,000 x 8.00

50,000 x 9.00

1BC6
T



2BC6
T

Each ticket would cost $8.00

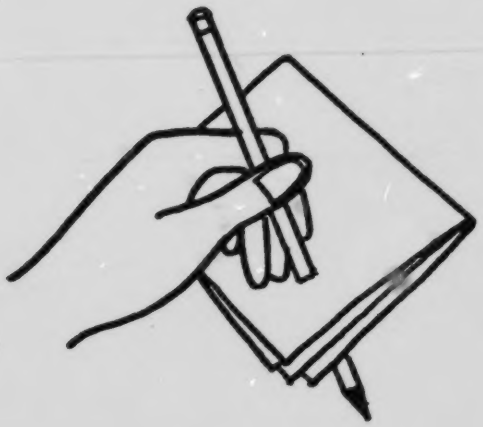
One team did the multiplications at the bottom of the card and found that 50,000 x 8.00 is equal to 400,000.

3BD6

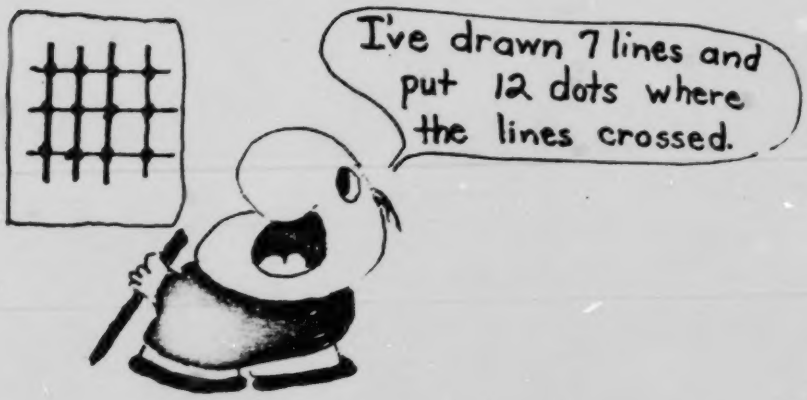
How many punches?

1. Fold a piece of paper into 4 parts.

2. Punch holes in the folded paper. How many punches will you make to get 28 holes in the paper?



4BD6



1. Draw a picture to show how you can use 9 lines to get 18 dots.
2. Show how to draw 12 lines to get 35 dots.

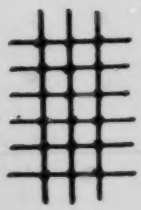
3BD6
T

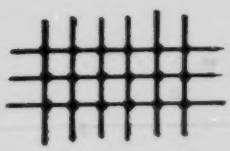
7 Punches

Most students punched holes in their folded paper and then unfolded the sheet to check their guesses. Some students realized that 1 punch would make 4 holes in the unfolded sheet. They divided 28 by 4 to get 7.

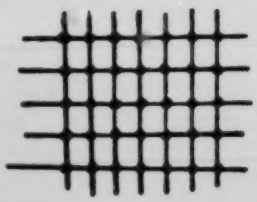
4BD6
T

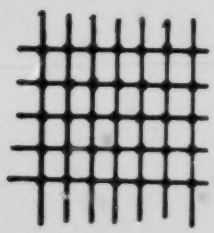
1.





2.





Most teams drew lines and counted points, then adjusted their drawings. There are other solutions if creative teams decide to draw lines that are not parallel.

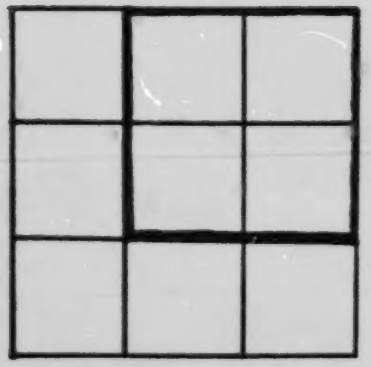
5BV6
T

45 passengers

One team decided half the seats were filled. They divided 90 by 2. Another team made a list of their guesses.

Seats Filled	Empty Seats	Total Seats
20	20	40
40	40	80
50	50	100
45	45	90

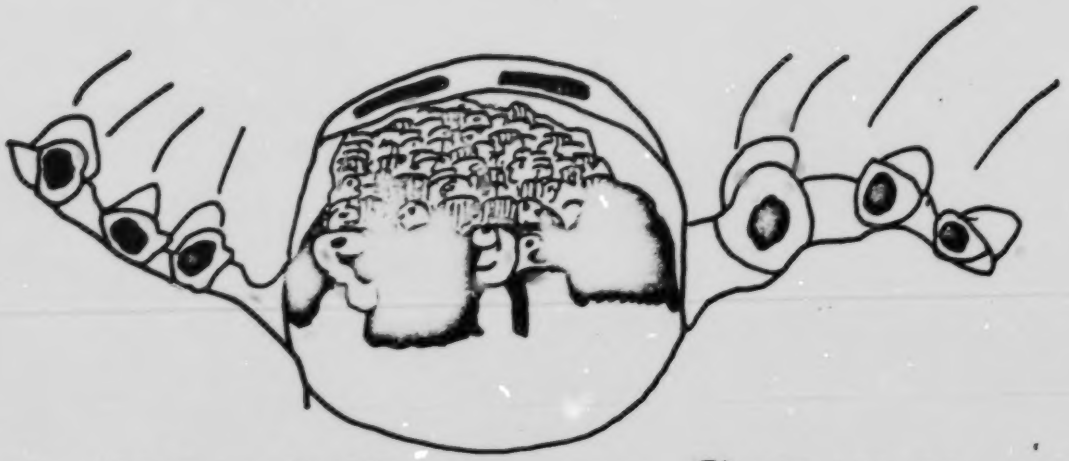
6BD6
T



9 Small Squares
4 Middle-Sized Squares
1 Large Square
14 Squares in all

Most teams drew pictures until their drawings fit the description.

5BV6



A Douglas DC-9 seats 90 passengers. There are as many empty seats as there are seats filled by passengers. How many passengers are on the plane?

6BD6

There are 5 squares in this picture.
Draw a similar picture that has 14 squares.

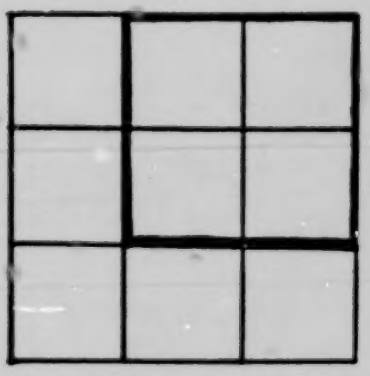
5BV6
T

45 passengers

One team decided half the seats were filled. They divided 90 by 2. Another team made a list of their guesses.

Seats Filled	Empty Seats	Total Seats
20	20	40
40	40	80
50	50	100
45	45	90

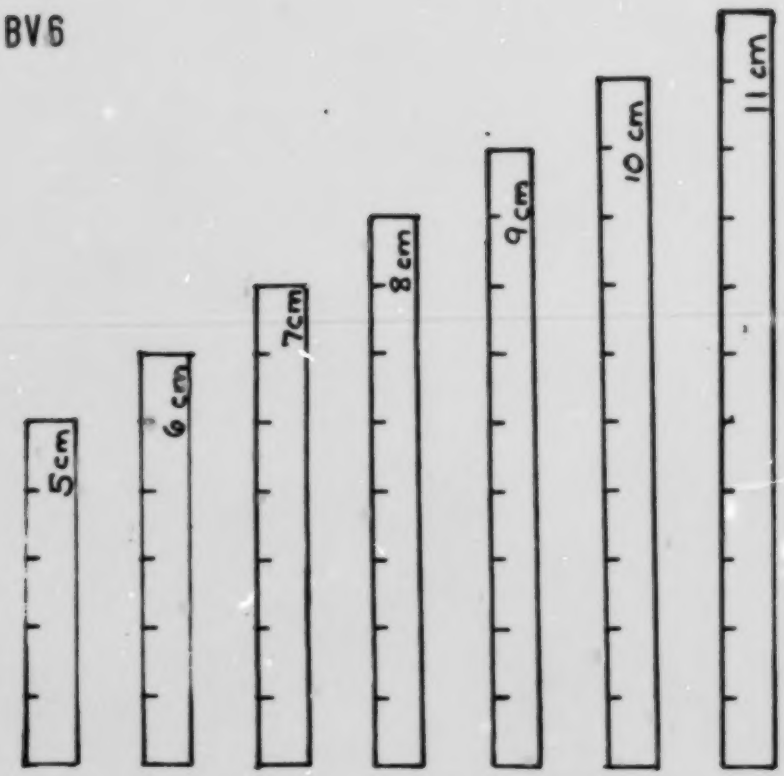
6BD6
T



9 Small Squares
4 Middle-Sized Squares
1 Large Square
14 Squares in all

Most teams drew pictures until their drawings fit the description.

7 BV6



1. Select two rulers that have a difference of 3 cm in length, but a sum of 15 cm.

2. Select two rulers that have a difference of 6 cm in length, but a sum of 16 cm.

8BM6 HOW LONG IS A MINUTE?

1. Look at a clock.
2. Close your eyes and guess how long a minute is.
3. Open your eyes and check the clock. Did you come within 10 seconds?
4. Try again and keep a record. See if you can improve your estimate.

7BV6
T

1. 6cm and 9cm rulers.
2. 5cm and 11cm rulers.

One team started guessing by picking rulers that had a difference of 3 (ie. 5,8; 6,9; 7,10). Then they tested for the sum needed and made their choice. Another team listed the various possibilities using two rulers such as:

Rulers	Difference	Sum	
5,6	1	11	
5,7	2	12	
5,8	3	13	etc.

8BM6
T

The students' records should reflect a refinement in their estimation skills.

9BD6

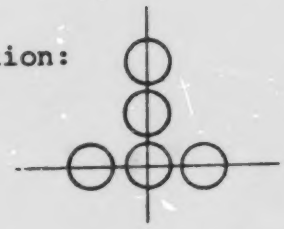
How can you arrange 5 pennies in rows with 3 pennies in each row?

10BV6

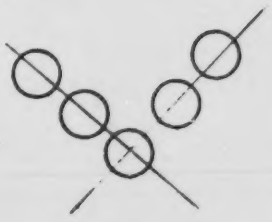
Gary went to the grocery store and bought apples and bananas. The apples cost 10¢ each and the bananas 12¢ each. He spent exactly $1.00. How many of each kind did he buy?

9BD6
T

One team found this solution:



Another team discovered this answer:



There are other answers for the problem. The secret is to put one penny in both rows.

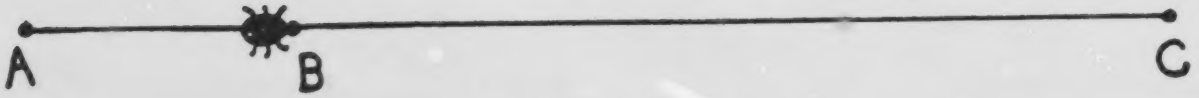
10BV6
T

Gary bought 4 apples (40¢) and 5 bananas (60¢)

One team found the answer by making a list of 10¢ and a list of 12¢ and adding to find a combination that added to $1.00.

10	40¢	12	60¢	.40
10		12		+ .60
10		12		
10		12		$1.00
10		12		
10				

11BM6



It has taken the bug 10 seconds to crawl from point A to point B. Suppose the bug continues to crawl at the same speed. Estimate how many seconds it will take the bug to crawl from B to C.

12BC6

I wrote five different counting numbers on five cards. The sum of the numbers is 15. What numbers did I put on the cards?

11BM6
T

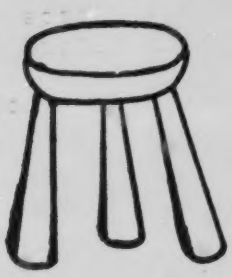
35 to 40 seconds

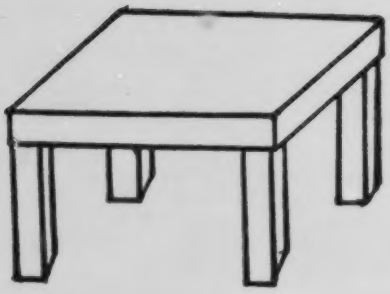
Some students used their fingers to estimate how far the bug crawled in 10 seconds. They then used their fingers to estimate how many seconds it will take the bug to crawl from B to C.

12BC6
T

5, 4, 3, 2, and 1 are the numbers on the cards.

13BV6





Lynn's dad worked in a carpenter shop. During the day he made only 3-legged stools and 4-legged tables. At the end of the day he had used 31 legs. How many stools and how many tables did he make?

14BM6

1. Guess the height of the door.
   a) 5 ft.
   b) 6 ft.
   c) 7 ft.
   d) 10 ft.

   The door knob is 3 feet from the floor. Now can you improve your estimate?

2. Guess the width of the door.

13BV6
T

There are three possible answers for this problem:
1 stool and 7 tables,
5 stools and 4 tables,
9 stools and 1 table.

One team found their answer by writing down a list of 3's and a list of 4's.

3
3
3 } 15
3
3
3
3

4
4
4 } 16
4
4
4

15
+ 16
31

and adding to find a combination that equaled 31.

Another team first looked to see if they could have 1 stool (yes; and 7 tables from the remaining 28 legs)
Then they looked to see if they could have 2 stools (no; tables wouldn't (exactly) use the remaining 25 legs)
Then they tried 3 stools (no; 22 legs)
Then they tried 4 stools (no; 19 legs)
Then they tried 5 stools (yes; and 4 tables from the 16 remaining legs) and so on.

14BM6
T

1. c) 7 feet

   The door knob is a little less than half way to the top of the door, so the best guess is 7 feet.

2. 3 feet

   The distance of the door knob to the bottom of the door provides a good referent in determining the width of the door.

15BM6

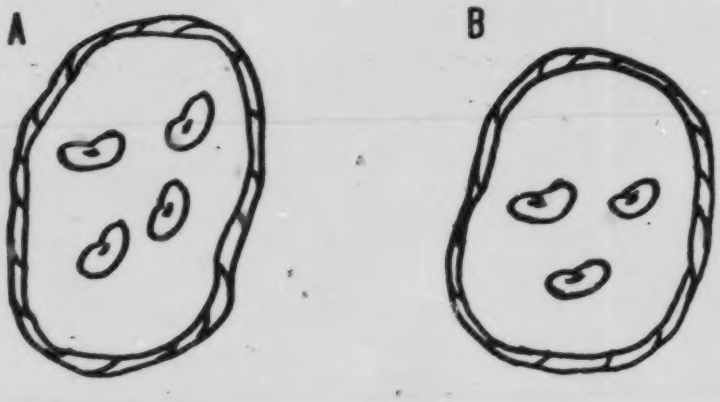
1. Guess the height of the shoe.

   a) 3 cm
   b) 6 cm
   c) 12 cm
   d) 24 cm

   The heel is 5 cm tall. Now can you improve your estimate?

2. Guess the length of the shoe.

16BD6



How many ways can you place 7 beans in 2 rings?

15BM6
T

1. The heel is about half the height of the shoe, so the best guess is 12cm.
2. 24 centimeters is a good estimate.

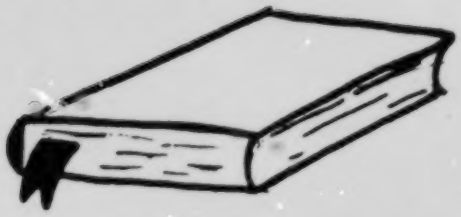
16BD6
T

8 ways

One team made this table to find the answer to the problem.

Ring A	Ring B
7	0
6	1
5	2
4	3
3	4
2	5
1	6
0	7

17BM5



1. Find a book.
2. Close your eyes.
   Put a bookmark in the book.
3. Open your eyes. Look at the book mark and guess the page number.
4. Try several more times. Keep a record of how many times your estimate was within 50 pages of the bookmark.

18BM6

My first rocket traveled 300 feet from the launching pad. Estimate how far my second rocket traveled.

17BM6
T

Check the students' records.

Some teams found that they were better estimators when the bookmark was placed near the center of the book.

One good estimator on a team informed his teammates that they should guess whether the bookmark looked like it was half-way through the book, a third of the way, etc.

Some team members found what a 100 page thickness looked like and made their estimates based on that information.

18BM6
T

350 feet is a good estimate.

Most teams took the 1st rocket's distance of 300 feet and estimated what 100 feet would be. They decided that the distance between the landing points of the 1st and 2nd rockets was about half the distance of 100 feet or 50 feet. Adding 50 feet to the original 300 feet of the 1st rocket gave them the distance of 350 feet for the second rocket.

19BM6

1. Guess the height of the tree.
   a) 10 ft.
   b) 20 ft.
   c) 30 ft.
   d) 40 ft.

   The car parked by the tree is 5 feet tall.
   Now can you improve your estimate?

2. Estimate the length of the car.

20BM6

How many times can you bounce a ball in one minute?

20 bounces
80 bounces
150 bounces
250 bounces

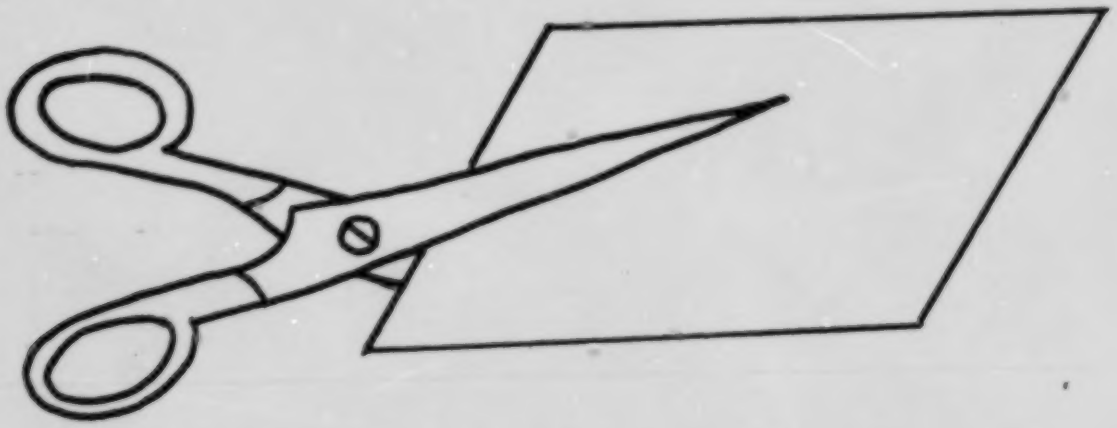
19BM6
T

1. b) 20 feet is the best guess for the height of the tree. The tree is about 4 times the height of the car.
2. About 12 feet long.

20BM6
T

The best answer is 80 bounces.
To check their guess one team watched the second hand on a clock while one member of the team bounced the ball.

1YM6



Snip a piece of paper with a scissors. Estimate how many snips it would take for you to cut a piece of paper 10 feet long.

2YC6

Make a guess to find the keys to punch for these. Test your guess on your calculator.

6 □ 8 = 14

6 □ 8 = 48

1 □ 8 = .125

6 □ 8 = -2

12 □ 15 = 180

125 □ 25 = 5

1YM6
T

Estimates will depend on scissors size.

60 snips is a good estimate for a 5 inch scissors.

40 snips is a good estimate for an 8 inch scissors.

2YC6
T

6 [+] 8 [=] 14

1 [÷] 8 [=] .125

12 [x] 15 [=] 180

6 [x] 8 [=] 48

6 [-] 8 [=] -2

125 [÷] 25 [=] 5

Something Else to Try:

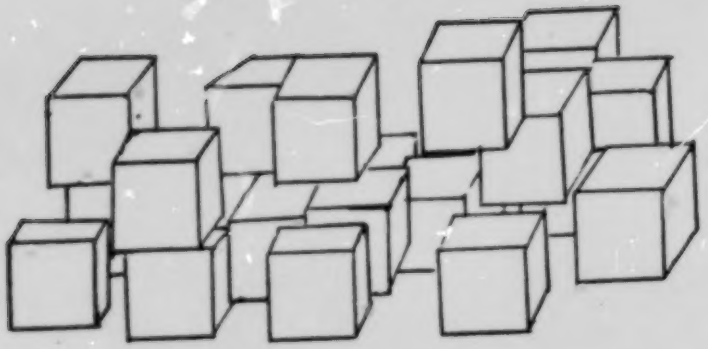
8 [+] 7 [-] 2 [=] 13

15 [x] 6 [+] 5 [=] 95

10 [x] 13 [x] 4 [=] 5200

20 [÷] 5 [+] 8 [=] 12

3YD6



What is the smallest number of cubes you can stack into 6 equal stacks and also into 8 equal stacks?

4YV6

I can build 8 chains with the same number of tabs in each chain. I can also build 9 chains with the same number of tabs in each chain. If I have less than 100 tabs, how many tabs do I have?

3YD6
T

24 cubes

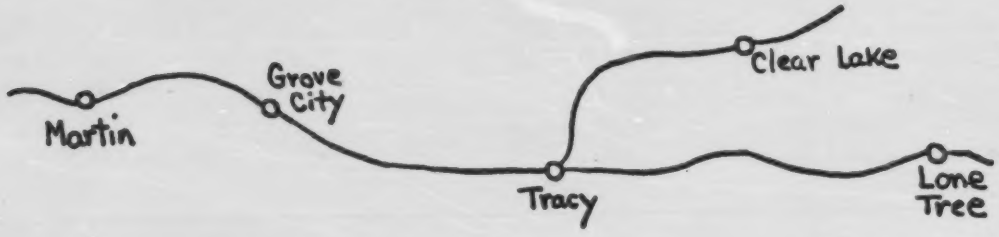
Many teams solved this problem by multiplying 6 x 8 and said 48 cubes would be needed. In rereading the problem, they noted that the "smallest number of cubes" was requested. After further guessing and checking, they decided 24 cubes were all that was needed.

4YV6
T

72 tabs

5YM6

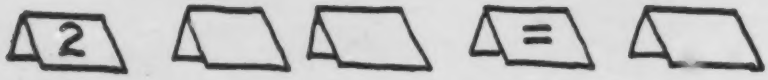
The distance between Martin and Grove City is 20 miles.

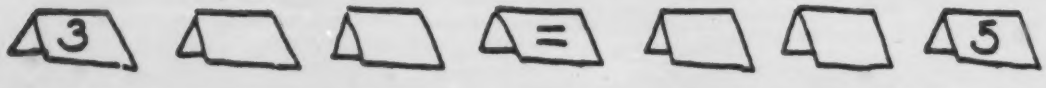


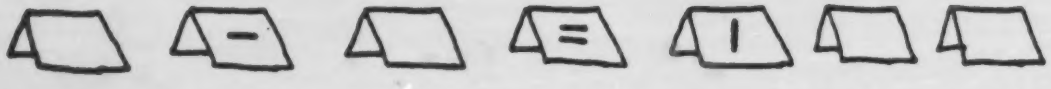
1. Estimate how many miles it is from Martin to Tracy.
2. How many miles from Grove City to Lone Tree?
3. Which two cities are about 40 miles apart?

6YC6

Show what are on these cards to make true statements. Remember I had only one of each card.

A 

B 

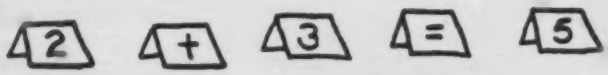
C 

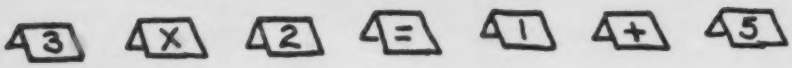
5YM6
T

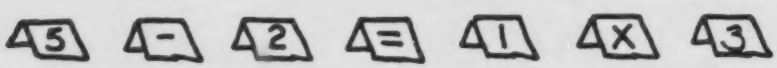
1. 50 miles is a good estimate.
2. 70 miles is a good estimate.
3. Tracy to Lone Tree.

6YC6
T

One team made their own set of number cards. They arranged the cards to make the true statements.

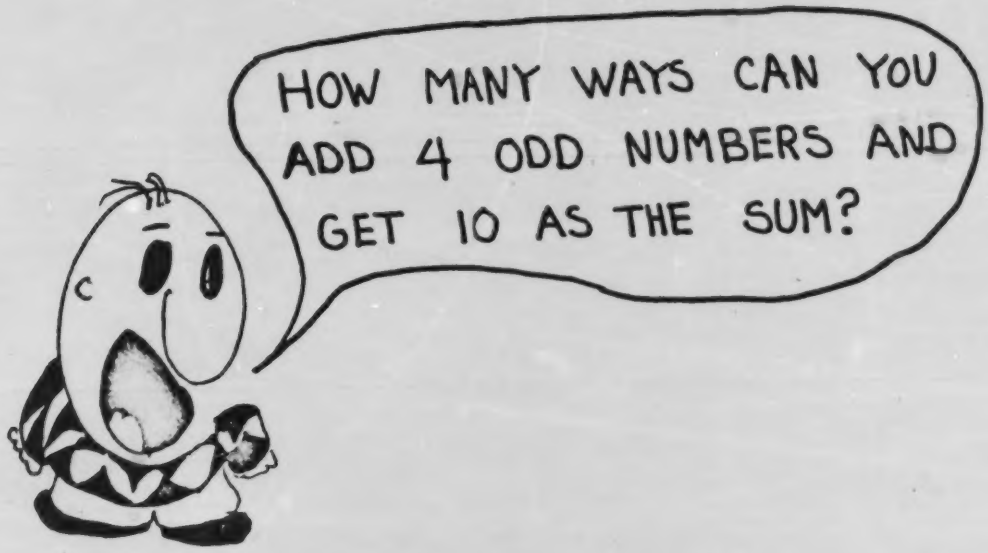
A. 

B. 

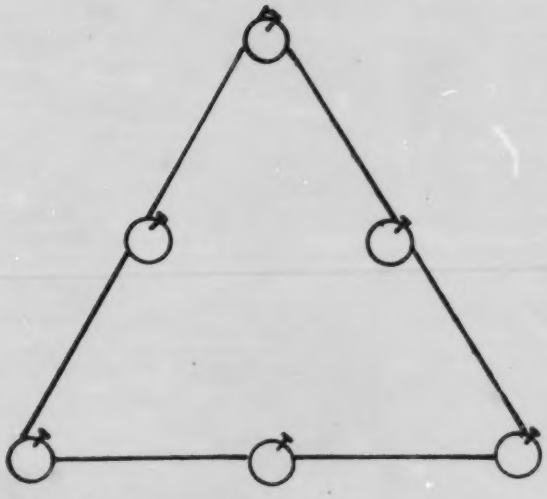
C. 

Other answers are possible.

7YV6



8YM6

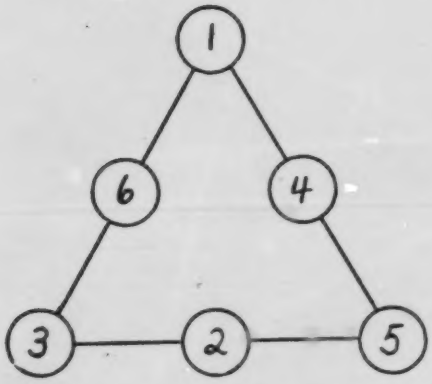


Using each of these tags ① ② ③ ④ ⑤ ⑥ place them on a nail in such a way that each side of the triangle adds up to 10.

7YV6 3 ways
T

The three ways are: 1 + 1 + 1 + 7
1 + 1 + 3 + 5
1 + 3 + 3 + 3

8YM6
T

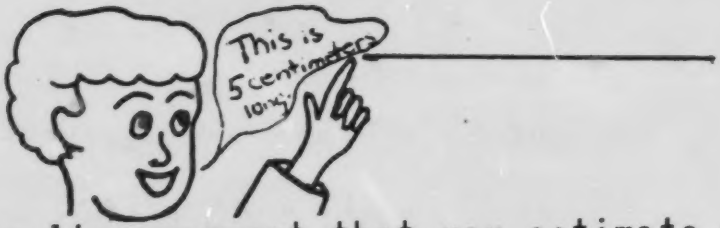


One team found the answer by trying different numbers for each place until all three sides added to 10. They also found that you can write the solution in different ways but that the numbers 1, 3, and 5 must always be in the "corners".

9YV6

A can with 40 marbles in it weighed 135 grams. The same can with 20 marbles weighed 75 grams. What is the weight of the can?

10YM6



1. Draw a line segment that you estimate to be 10 centimeters long. Use the line segment at the top of the card to check your estimate.
2. 10 centimeters is the same as 1 decimeter. Draw a line segment that you estimate to be 2 decimeters long. Check your estimate.
3. Draw a line segment that you estimate is 15 centimeters long. Check your estimate.

9YV6
T

15 grams

One team guessed different weights for a marble. When they guessed that a marble weighed 3 grams, 40 marbles weighed 120 grams leaving 15 grams for the can. Twenty marbles weighed 60 grams leaving 15 grams for the can.

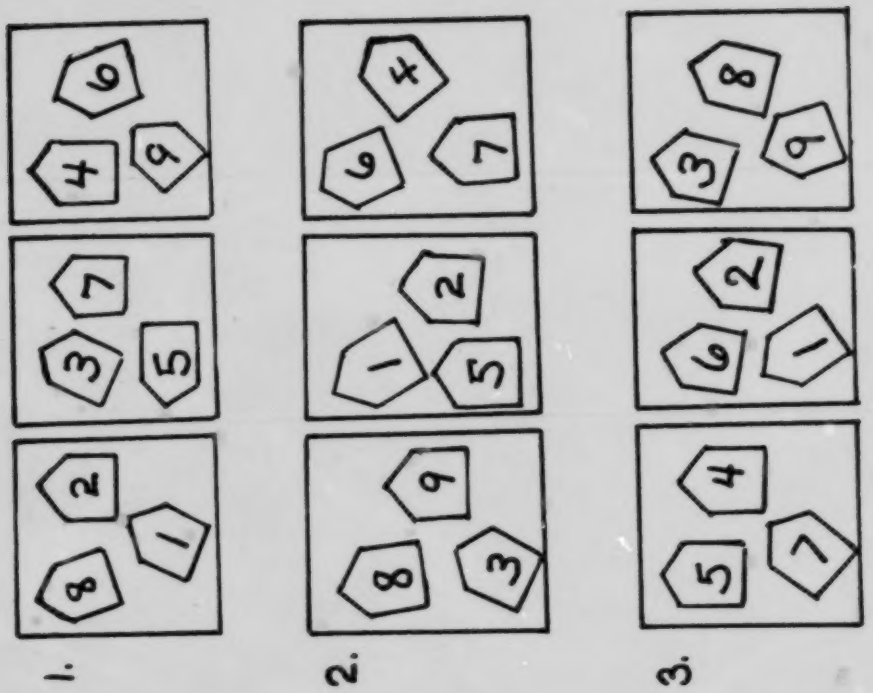
Another team thought that if a can of 20 marbles weighs 75 grams, then another can of 20 marbles would also weigh 75 grams. So 2 cans and 40 marbles weighs 150 grams. Subtracting 135 grams from 150 grams makes 1 can weigh 15 grams.

10YM6
T

The student should be able to use his first and second estimates in making his third estimate.

11YC6

Rearrange the number tags so each box has 3 tags in it and a sum of 15. Draw a picture of your answers.



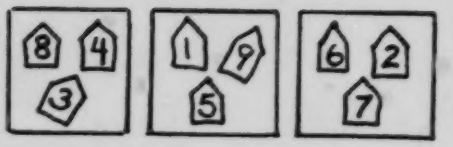
12YV6

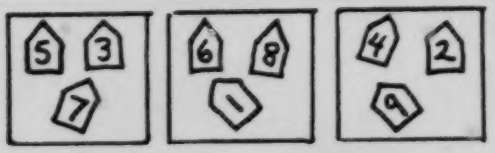
During the current softball season, Jane and Mary had a total of 190 hits. If Mary had 20 more hits than Jane, how many hits did each have?

11YC6
T

Many solutions are possible.

1.

2. 

3. 

One team wrote the numerals on tags. They rearranged their number tags and checked their guesses.

12YV6
T

Mary had 105 hits and Jane had 85 hits.

One team listed pairs of numbers that added to 190.

(95, 95), (100, 90), (105, 85), (110, 80), (115, 75), and so on.

Then they looked in their list for the pair in which one number was 20 more than the other.

Another team listed pairs of numbers in which one number was 20 larger than the other.

(65, 85), (70, 90), (75, 95), (80, 100), (85, 105),

(90, 110), (95, 115), and so on.

Then they looked in their list for the pair in which the numbers added to 190.

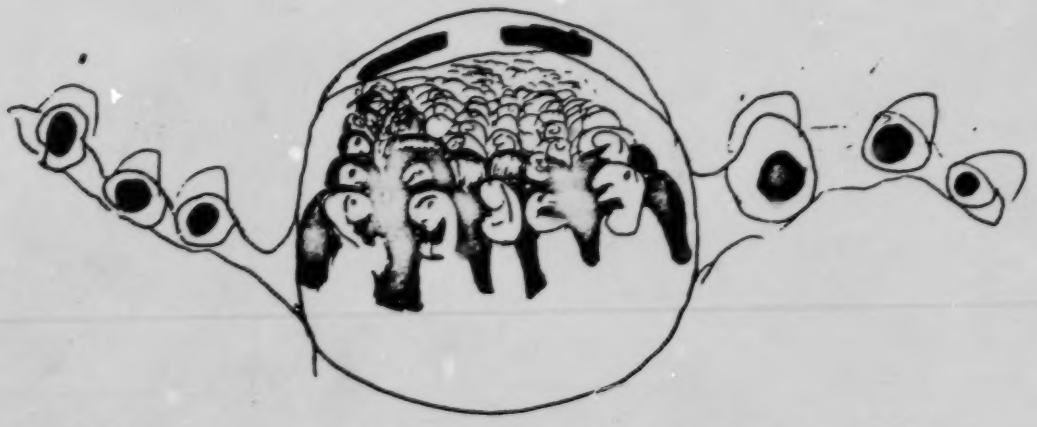
13YM6

Wisconsin has an area of 56,154 sq. miles.

Match these areas to the other states.

56,290 sq. mi.
70,665 sq. mi.
77,047 sq. mi.
84,068 sq. mi.

14YV6



A Douglas DC-9 has seats for 90 passengers on Flight 495 to Atlanta. There is one empty seat for every two seats that are filled. How many passengers are on Flight 495?

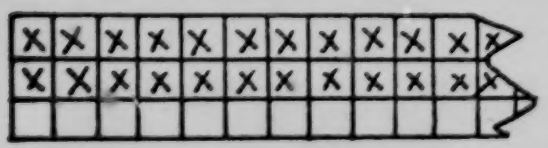
13YM6
T

North Dakota	70,665 sq. miles
South Dakota	77,047 sq. miles
Minnesota	84,068 sq. miles
Iowa	56,290 sq. miles

Many teams made their choices by determining which state had the largest area, then which state had the smallest area, and finally making the area comparison of North and South Dakota.

14YV6
T 60 passengers

One team used a diagram. They used X's to represent passengers and found they had drawn 60 X's.



Another team thought 1 empty seat for every 3 seats. They divided 90 by 3 and found that 30 + 60 = 90.

15YD6

How far is it around a coke can that is 7 centimeters across?

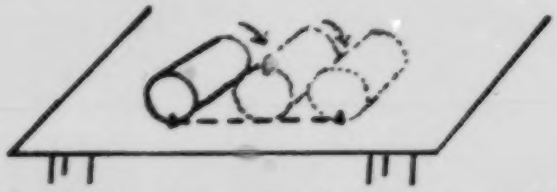
16YV6

When my father was 31 I was 8. Now he twice as old as I am. How old am I?

15YD6 About 22 centimeters
T

One team wrapped a string around the coke can and then measured the length of the string.

Another team marked a spot on the rim of the coke can, laid can on a table with the mark down, rolled the can until the mark was down again, and then measured the distance between the marks.



Another team measured the distance around the can using a tape measure.

Another team found a formula for finding the distance around a circle.

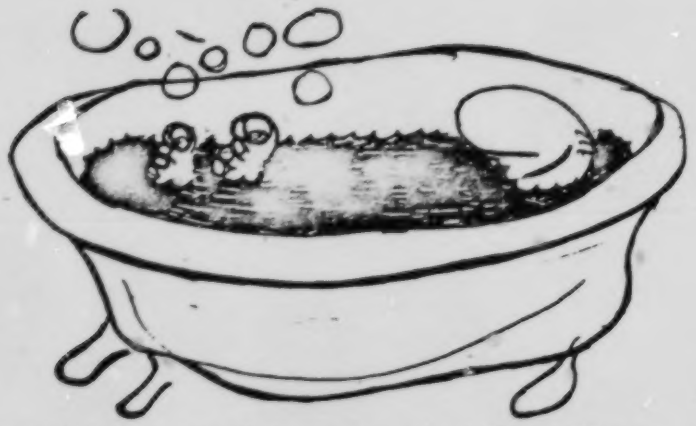
16YV6
T The person is 23 years old; the father is 46.

One team listed the ages of the person and the father.

Person	Father
8	31
9	32
10	33

They continued the pattern until they saw the father's age was twice as much as the other person's.

17 YM6



A full size bathtub holds about 45 gallons of water.

1. Estimate how much water you use when you take a bath.
2. Estimate how many baths you take in a year.
3. Estimate how many gallons of bathtub water you use in a year.

18YC6

Your teacher gives you 1 bonus point on the first day of school, 2 bonus points on the second, 4 bonus points on the third, 8 bonus points on the fourth and so on. Which of the numbers below tells you how many bonus points she would give you on the twelfth day?

128 256 1024 2048 4096

17YM6
T

The amout of bath tub water a student estimates he uses in a year will be determined by his estimates in Parts 1 and 2.

18YC6
T

2048 bonus points

One team made a table to be sure they didn't skip a day. The table looked like this:

Day	1	2	3	4	5	6	7	8	9	10	11	12
Number of Pennies	1	2	4	8	[illegible]	32	64	128	256	512	1024	2048

19 YV6

1. I am thinking of a number. Three times the number equals the number plus 44. What is the number?
2. I am thinking of a number. The number times six equals the number plus 65. What is the number?

20 YV6

Mary thought of a number. She multiplied the number by 4, then added 6. This result she divided by 2. Finally she subtracted 4. If her result was 59, what number was Mary thinking of?

19YV6
T

A. 22
B. 13

A. One team would pick a number. Then some would multiply the number by 3 while others added the number to 44. When they got the same result they knew they had picked the right number.

B. The team would pick a number. Then some of the team would multiply the number by 6 while others added the number to 65. When they got the same result they knew they had picked the right number.

20YV6
T The number was 30.

One team found the number this way. They guessed the number was 100. They multiplied it by 4 (got 400), added 6 (got 406) divided by 2 (got 203), subtracted 4 (got 199). Since 199 is too big, 100 was too big a number to start with. So they guessed again, picking a smaller number the next time.

Another team worked backwards from 59. What number minus 4 equals 59? (63) What number divided by 2 equals 63? (126) What number plus 6 equals 126? (120) What number times 4 equals 120? (30). To check if 30 was the number Mary thought of, they started with 30 and followed all the directions.

21YM6

1. Open a book.
2. Now try to open the book to a page number 2 times greater than your first number.
3. Was your estimate within 10 pages?
4. Try it again and see if you can improve your estimate.

22YC6

Jo set her watch at 8 a.m. At 2 p.m. she noticed that her watch had gained 3 minutes. Estimate how many minutes her watch would gain in 24 hours.

21YM6
T

Some students realized that they could make a better estimate if they used the thickness of the first group of pages to estimate the thickness needed to turn to the desired page number.

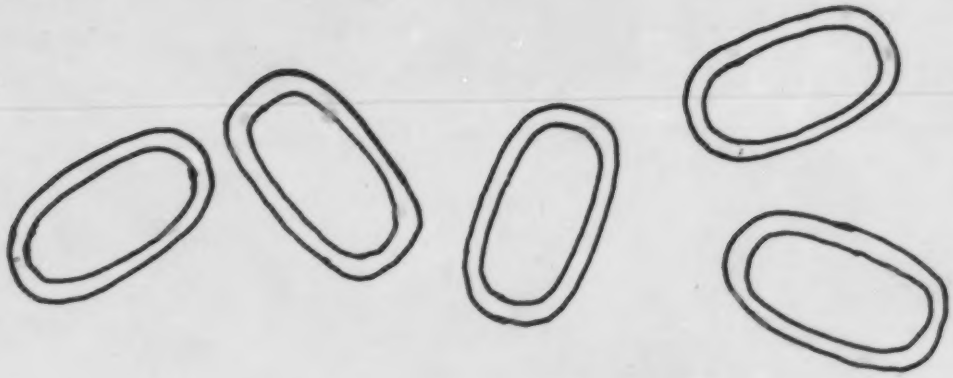
22YC6
T

12 minutes

One team decided that the watch gained 3 minutes every 6 hours and 6 x 4 = 24 hours so they multiplied 3 x 4 and decided a total of 12 minutes was gained.

Another team decided the watch gained an half a minute (30 seconds) every hour so in 24 hours it gained 720 seconds or 12 minutes.

23YD6



If it cost a nickel each time you cut and weld a link, what is the least amount you can pay and make a chain out of the 5 links?

24YC6

Three boys put a dime in a scale. All three got on the scale and it showed 380 pounds as their total weight. One of the boys stepped off and the scale showed 235 pounds. One more boy stepped off and the scale showed 110 pounds. What was the weight of each boy?

23YD6
T 10 cents

The second and fourth links were cut and welded.

This solution costs least.

24YC6
T

The three boys weighed 145 lbs, 125 lbs, and 110 lbs.

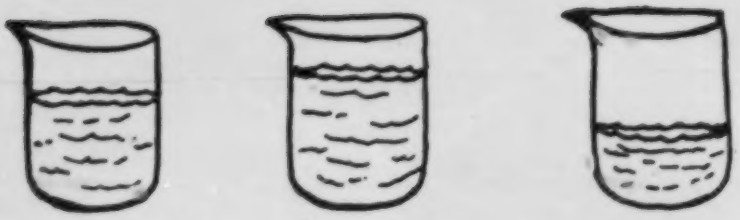
One team found the answer to this problem this way.

$$\begin{array}{r} 380 \\ -\ 235 \\ \hline 145 \end{array}$$ The first boy who stepped off weighed 145 lbs.

$$\begin{array}{r} 235 \\ -\ 110 \\ \hline 125 \end{array}$$ The second boy who stepped off weighed 125 lbs.

The boy who was left weighed 110 lbs.

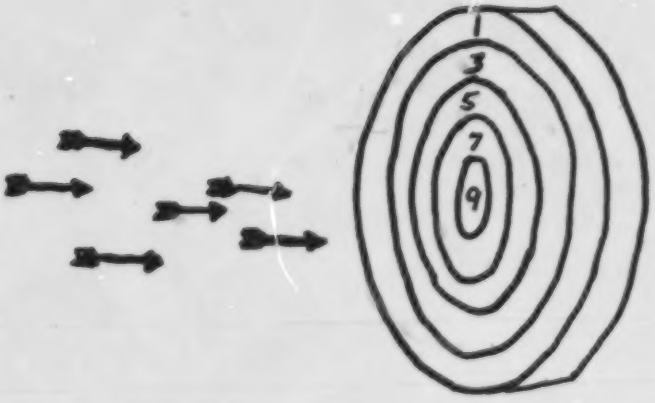
25YC6



You are given three beakers. In one beaker you have 125 ml of solution. In the second beaker you have 175 ml and in the third beaker you have 90 ml. How much solution would you have in each beaker if they all contained the same amount?

26YD6

Sue was taking archery. One day she shot 6 arrows. Each hit the target. Which of the following numbers could have been her score:
17, 28, 5, 56, 35



25YC6
T

130 ml.

One team wrote down the amount in each beaker:	125	174	90
Then they imagined taking 40 from one & putting it in another - - - - - -	same	-40	+40
	125	135	130
Then they took 5 from one & put it in another	+5	-5	same
	130	130	130

Another team thought this way--
How much do we have altogether? (125 + 175 + 90 = 390)

If we divide 390 into 3 equal parts, how much is in each part? (130)

Another team thought much like the second team--
First they found there was 390 ml altogether.
Then they asked themselves,"What number could added 3 times to get 390?" Since 130 + 130 + 130 = 390, each beaker must have 130 ml.

26YD6
T

Sue's score could have been 28.

The largest score possible is 6 9's; 56 is too big.

The smallest score possible is 6 1's; 5 is too small.

17 and 35 are not possible either. Six odd numbers will always have an <u>even</u> sum.

Severa combinations give scores of 28.

27 YC6

How many pieces of paper does it take to make a pile 1 centimeter thick?

Use your estimate to answer these:

1. If a stack of paper is 5 centimeters thick, how many sheets are in the stack?
2. How many sheets would there be in a stack 1 meter high (100 centimeters?)
3. How high a stack would a million sheets of paper make?

28 YC6

Three different whole numbers are multiplied together. The product is 1001. What are the three numbers?

27YC6
T . A stack of 100 sheets is about 1 cm thick.

1. 500 sheets is a good estimate
2. 10,000 sheets
3. 100 meters

One team stacked up paper until it was 1 centimeter thick and then counted the sheets. They used this estimate to answer the other questions. Another team took a ream of 500 sheets of paper and found that it was about 5cm thick.

28YC6
T Any of these four answers is ok---

7, 11, and 13
1, 7, and 143
1, 11, and 91
1, 13, and 77

One team started by trying to find <u>two</u> numbers whose product is 1001. They didn't find a number to multiply by 2, by 3, by 4, by 5, or by 6 to get 1001. But they found that 7 x 143 is 1001. Then they looked for two numbers whose product is 143. They found that 11 x 13 =143. Then they knew that 7 x 11 x 13 = 1001.

Another team looked for a number that divided 1001 evenly. They found that 1001 ÷ 7 = 143. Then they looked for a number that divided 143 evenly. They found that 143 ÷ 11 = 13. Then they knew that 11 x 13 = 143 and that 7 x 143 = 1001, so that 7 x 11 x 13 = 1001.

1WM6

MAKE A GUESS

1. Most people can walk a mile in:

   1.5 minutes 15 minutes 150 minutes

2. At 50 miles per hour, a car can travel 1 mile in:

   50 seconds 72 seconds 120 seconds

3. Many people work 8 hours in a day. This is:

   48 minutes 480 minutes 4800 minutes

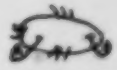
4. A jet plane can travel a mile in:

   6 seconds 60 seconds 600 seconds

5. A fast snail travels about 6 inches in:

   1 day 1 hour 1 minute

2WC6



Fish Bait
$1.29

Reel
$12.75

Pole
$15.50

Line
$3.45

Boots
$15.85

Net
$4.75

Some fishermen bought fishing equipment. The amount they spent and the number of articles are given. Which articles did they buy?

$14.04	$20.25	$9.49	$31.70
____	____	____	____
____	____	____	____
		____	____

1WM6
T

(1) Most people can walk a mile in 15 minutes.
(2) A car traveling at 50 mph can travel 1 mile in about 72 sec.
(3) Eight hours is 480 minutes.
(4) A jet plane can travel a mile in 6 seconds.
(5) A fast snail travels about 6 inches in 1 minute.

Check 15 + 72 + 480 + 6 + 1 = 574

One team discussed the problem this way:

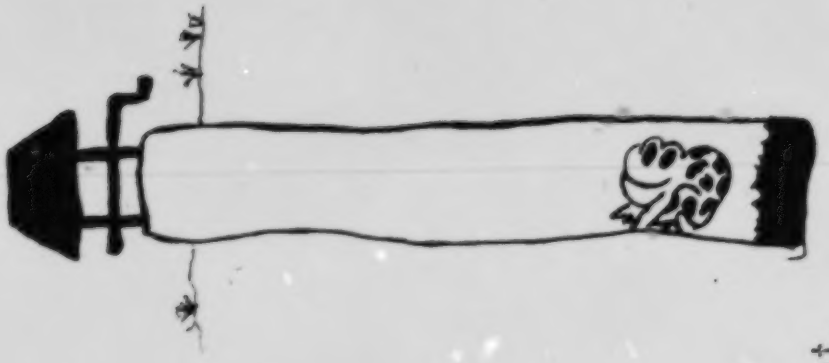
(1) It's about a mile from my grandmother's house to mine and it takes me about 15 minutes to walk there.
(2) A car traveling at 60 mph, goes a mile in 60 seconds, so if it is going at 50 mph it would take a little longer or 72 seconds.
(3) All we have to do on this one is multiply, 8 x 60 = 480.
(4) A jet plane is much faster than a car and a car can travel a mile in 60 seconds so the answer must be 6 seconds.
(5) A fast snail must be able to go 6 inches in a minute.

2WC6
T

Reel	$12.75	Pole	$15.50
Bait	1.29	Net	4.75
	$14.04		$20.25

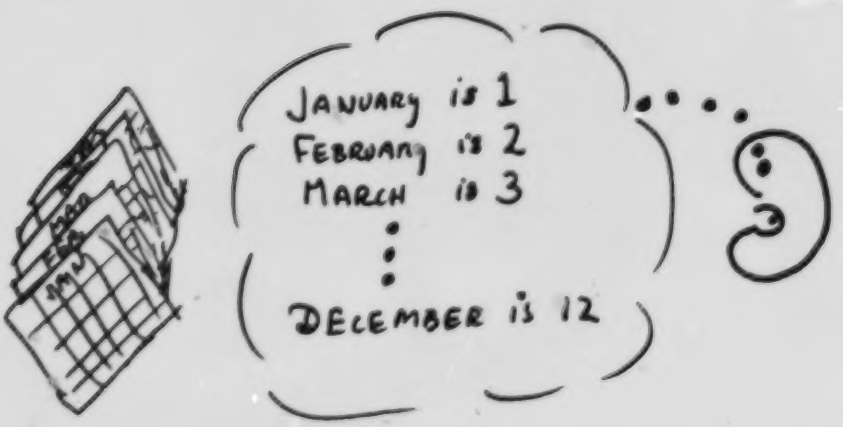
Bait	$ 1.29	Pole	$15.50
Line	3.45	Reel	12.75
Net	4.75	Net	4.75
	$ 9.49		$31.70

3WD6



A well is 10 feet deep. A frog climbs up 5 feet during the day but falls back 4 feet during the night. Assuming that the frog starts at the bottom of the well, how many days does it take the frog to get to the top?

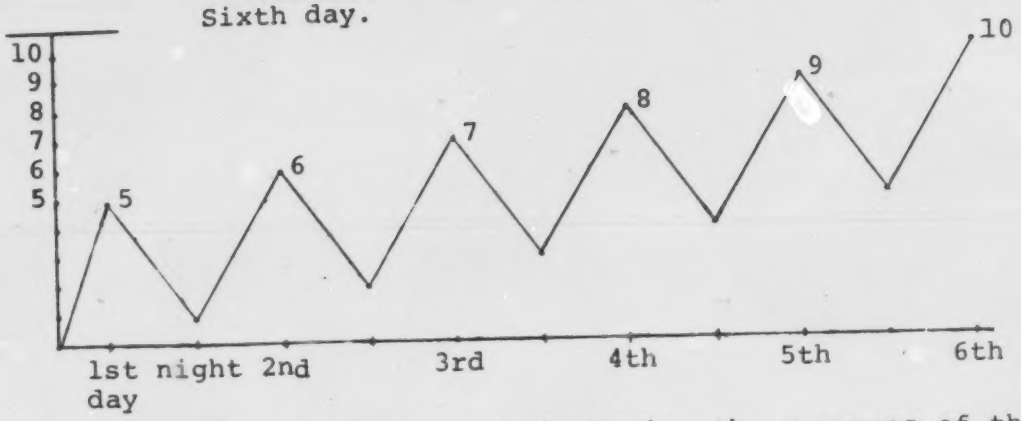
4WV6



The sum of the month of the year and the day of the month is 35. When you subtract tne month of the year from the day of the month, the difference is 17. What day of the month is it?

3WD6
T

Sixth day.



One team made the graph (above) showing the progress of the frog.

Another team made this record.

1st day Up to 5 back to 1
2nd day Up to 6 back to 2
3rd day Up to 7 back to 3
4th day Up to 8 back to 4
5th day Up to 9 back to 5
6th day Up to 10

4WV6
T

26th day (9th month)

Most teams made a list of the months and days that equal 35 when added.

(December) 12 + 23 = 35
11 + 24 = 35
10 + 25 = 35
9 + 26 = 35

They found that the 26th day of the 9th month had a difference of 17.

5WC6

MAKE A GUESS

Which of these computations would "overflow" on an 8 digit calculator.

A. $\begin{array}{r} 829 \\ \times 645 \end{array}$

B. $\begin{array}{r} 14750 \\ \times 9843 \end{array}$

C. $\begin{array}{r} 9.861 \\ \times 6.254 \end{array}$

D. 12345678 x 2

E. 43210 x 62500

F. $\begin{array}{r} 46389 \\ \times 1007 \end{array}$

G. $\begin{array}{r} 56.250 \\ \times 94.86 \end{array}$

H. $\begin{array}{r} 34100 \\ \times 6035 \end{array}$

Check your guesses on a calculator.

6WD6

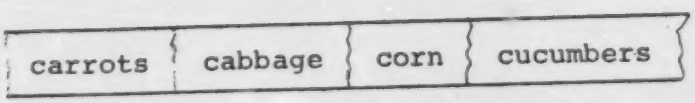
Mrs. Hoel wanted to plant corn, carrots, cabbage, and cucumbers.

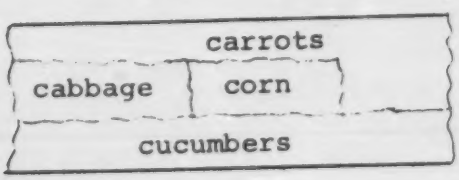
1. Show how she could plant the vegetables so cabbage is next to corn and carrots, and corn is next to cabbage and cucumbers.
2. Show how she could plant the vegetables so each type is next to each of the other three types.
3. Mr. Root wanted to plant peas, peppers, potatoes, parsnips and pumpkins. Can he plant the vegetables so each type is next to each of the other four types?

5WC6
T

B, E, F, H

6WD6
T

1. 

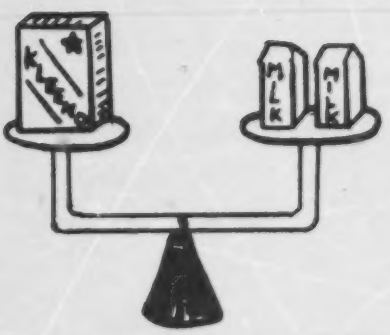
2. 

3. No, it cannot be done.

7 WV6

IN A COLLECTION OF QUARTERS AND NICKELS, THERE ARE 2 MORE NICKELS THAN QUARTERS. HOW MANY NICKELS ARE THERE IF THE COLLECTION IS WORTH $3.40?

8WM6



1. Guess the weight of the box of laundry soap.
   a) 1 kilogram
   b) 2 kilograms
   c) 4 kilograms
   d) 8 kilograms
2. The box of laundry soap weighs about the same as the 2 liters of milk. What does the soap weigh?
3. A liter of milk weighs about 1 kilogram. What does the box of laundry soap weigh?

7WV6
T

13 nickels (and 11 quarters)

One team listed some numbers in a table so there were 2 more nickels than quarters.

nickels	10	20		
quarters	8	18		

Then they found the value of the coins.

10 nickels	20 nickels
8 quarters	18 quarters
$2.50	$5.50

From that they knew there were between 10 and 20 nickels.

8WM6
T

2 kilograms

One team thought this way:

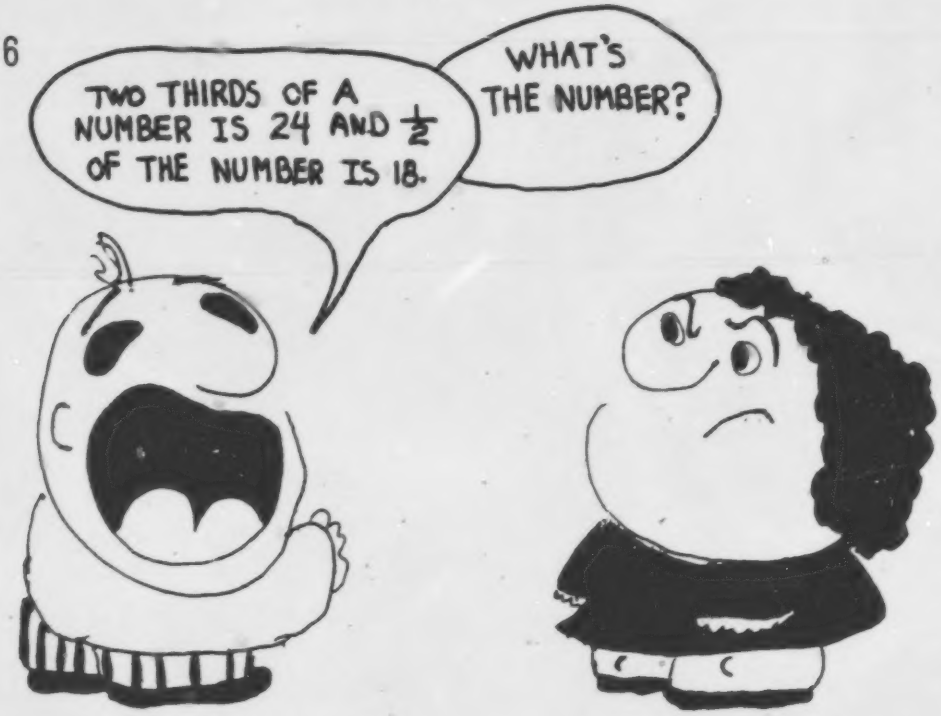
1 milk = 1 kilogram

2 milk = 2 kilograms

but 2 milk = 1 soap

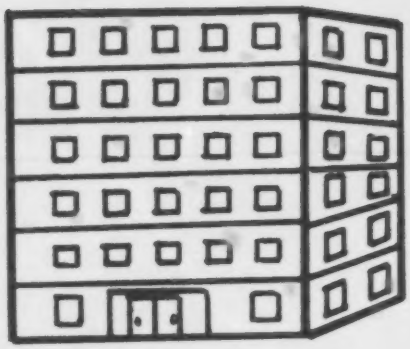
so 1 soap = 2 kilograms.

9 WC6



10WD6

A building has 6 stories, each the same height. It takes 10 seconds for the freight elevator to get from the ground floor to the third floor. How long does it take for the elevator to go from the ground floor to the sixth floor?



9WC6
T

The number is 36

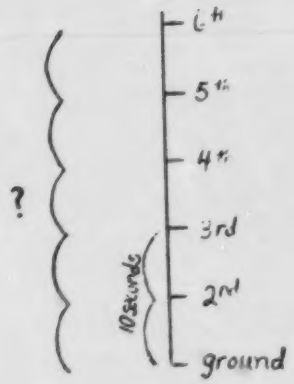
One team asked themselves, "Half of some number is 18; what is the number?" They figured out that the number is 36. (They didn't use the information about 2/3 of the number)

Another team thought, if 2/3 of a number is 24, then 1/3 of the number must be 12. Then they asked themselves, "One-third of what number equals 12?" They figured that since $36 \div 3 = 12$, the number they were looking for must be 36. (They didn't use the information about 1/2 of the number.)

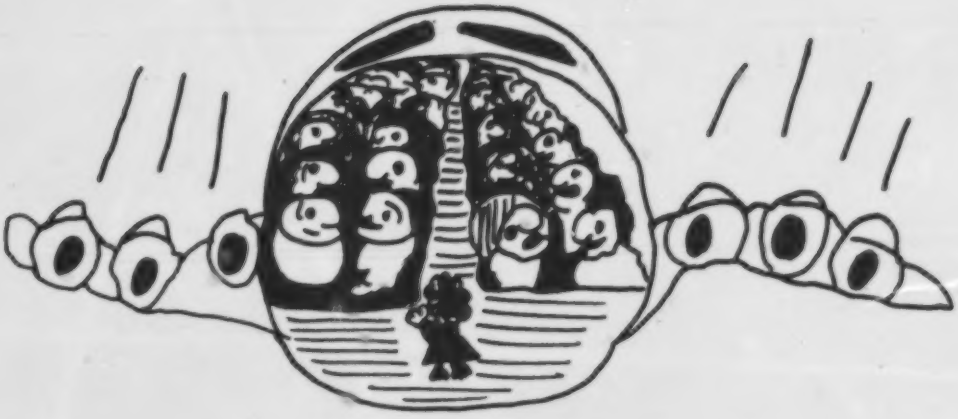
10WD6
T

25 seconds.

It takes 10 seconds to make 2 "jumps". Therefore, each "jump" takes 5 seconds. The 5 "jumps" to the 6th floor take 25 seconds.



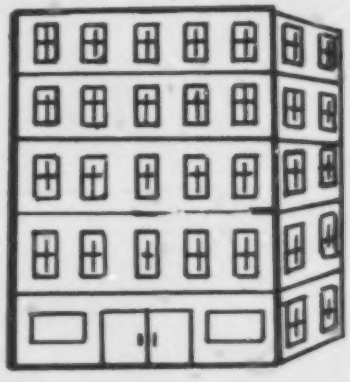
11WV6



A Douglas DC-9 has 90 seats for passengers. The difference between the number of filled seats and the number of empty seats is 72. How many passengers are on the plane?

12WM6

1. Guess the height of the building.
   a) 6 meters
   b) 20 meters
   c) 35 meters
   d) 50 meters
2. Each floor of the building is about 4 meters tall. What is the height of the building?
3. Guess the length and width of the building.



11WV6
T

81 filled seats

One team thought this way.

When 80 seats are filled, 10 seats are empty.
The difference is 70.

When 82 seats are filled, 8 are empty.
The difference is 74.

When 81 seats are filled, 9 are empty.
The difference is 72.

12WM6
T

The best guess for the height of the building is 20 m.

One team made this chart to help them find the height of the building.

Floors	1	2	3	4	5
Height	4m	8m	12m	16m	20m

By looking at the picture, they guessed that the width of the building is 15 m. and the length is 8m.

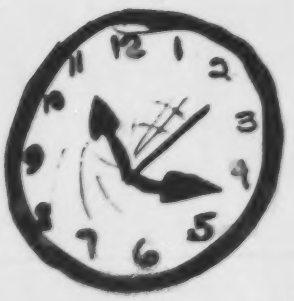
13WC6

You are in the business of designing egg cartons. Each row must hold the same number of eggs.

1. List all of the different cartons you could have to hold 36 eggs.
2. Which carton design is longest?
3. Which carton is shaped like a square?

14WD6

In 24 hours how many times does the minute hand cross the hour hand?



13WC6
T

The cartons could be any of these--

1 row, 36 eggs in each
2 rows, 18 eggs in each
3 rows, 12 eggs in each
4 rows, 9 eggs in each
6 rows, 6 eggs in each
9 rows, 4 eggs in each
12 rows, 3 eggs in each
18 rows, 2 eggs in each
36 rows, 1 egg in each

The carton with 1 row (or 36 rows) is longest.
The carton with 6 rows is like a square.

14WD6
T

22 Times.

Every 12 hours the minute hand passes the hour hand 11 times. Try it!

One team found that during one day the minute hand went around 24 times while the hour hand went around 2 times. Since the minute hand went around 22 times more, it must have passed the hour hand 22 times.

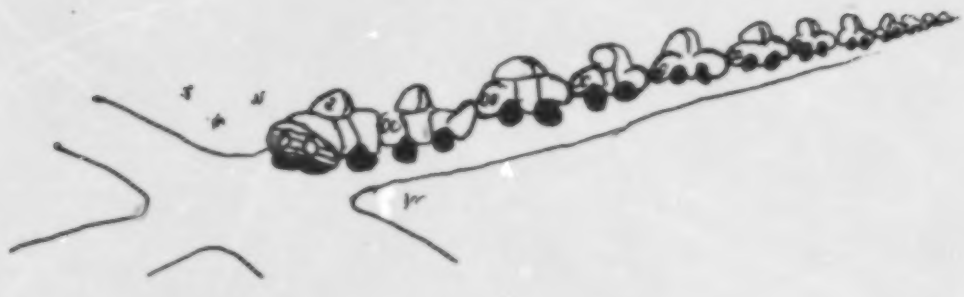
15 WM6

The bug has crawled 12 centimeters in traveling along the path from point A to point B.

1. Will the bug be crawling up or down after having traveled 20 more centimeters?
2. It took the bug 10 seconds to crawl from A to B. If the bug continues to crawl at this rate, estimate how many seconds it will take the bug to crawl from A to C.

16 WC6

If a car is 18 feet long, how many cars can you park end to end in a 300 foot block?



15WM6
T

1. Up
2. 50 Seconds

1) One team first guessed the length of one segment. Since the bug had crawled 2 segments and a little more, they decided each segment must be 5cm long. (They first guessed 6cm and found that was too long. Next they guessed 4 cm and found that was too short.)

   After crawling 10cm more, the bug is again crawling up. After another 10cm, the bug again is crawling up.

2) Since each segment is 5cm long, the route from A to C is 60cm. Every 12cm takes 20 seconds; 24cm→20 sec., 36cm→30 sec., 48cm→40 sec., 60cm→50 sec.

16WC6
T

16 cars

One team made this table--

Cars	1	10	15	16	17
Feet	18	180	270	288	306

Another team divided: 300 ÷ 18. They got 16 for the quotient.

17WD6

Trace the 4 pieces below. Cut them out and put them in the form of the number 7.

18 WV6

I'll pay you every science 10¢ for every have right— problem you take but I'll 5¢ for every problem you missed
Here are all problems I worked today
Hmmm—is you get 15¢

How many of her answers were correct?

17WD6
T

18WV6
T

right and 15 wrong.

O[illegible] listed numbers which might be the number answered co[illegible]rectly. Beside each number they wrote the number missed and then the payoff. They stopped when they found the payoff was 15¢. Their list looked like this--

Number answered Right	Number answered Wrong	Payoff
12	12	$1.20 - .60 = .60
11	13	1.10 - .65 = .45
10	14	1.00 - .70 = .30
9	15	.90 - .75 = .15

19WC6

Bob works in a grocery store. One day they received a shipment of 700 apples. His boss told him to put the apples in boxes so that each box would hold the same number of apples. He went to the storage room and found boxes that would hold 24, 35, 56, 78 and 90 apples each. Which size of box should he use so that no apples are left over?

20WC6

Sue had a code where letters were used for numbers. Each letter in the addition exercise stands for one of these numbers -- 0, 1, 4, 5

$$\begin{array}{r} IS \\ +\ SS \\ \hline TEE \end{array}$$

What number does each letter represent?

19WC6
T

35-apple boxes.

One team added 24's as many times as they could to see if they would ever reach exactly 700. Since they didn't get exactly 700, they tried adding 35's. They found that 20 35's add to exactly 700. They tried adding 56's, 78's, and 90's but never got exactly 700.

Another team multiplied 24, 35, 56, 78, and 90 by different numbers to see if they would ever get exactly 700.
20 x 35 = 700 was the only multiplication that worked.

Another team divided 700 by 24, by 35, by 56, by 78, and by 90.
The only division that had no remainder was 700 ÷ 35.

20WC6
T

In Sue's code S → 5, E → 0, I → 4, and T → 1

The addition exercise was

$$\begin{array}{r} 45 \\ +\ 55 \\ \hline 100 \end{array}$$

In Lester's code Q → 6, S → 8, P → 7, and R → 2.
The addition exercise was

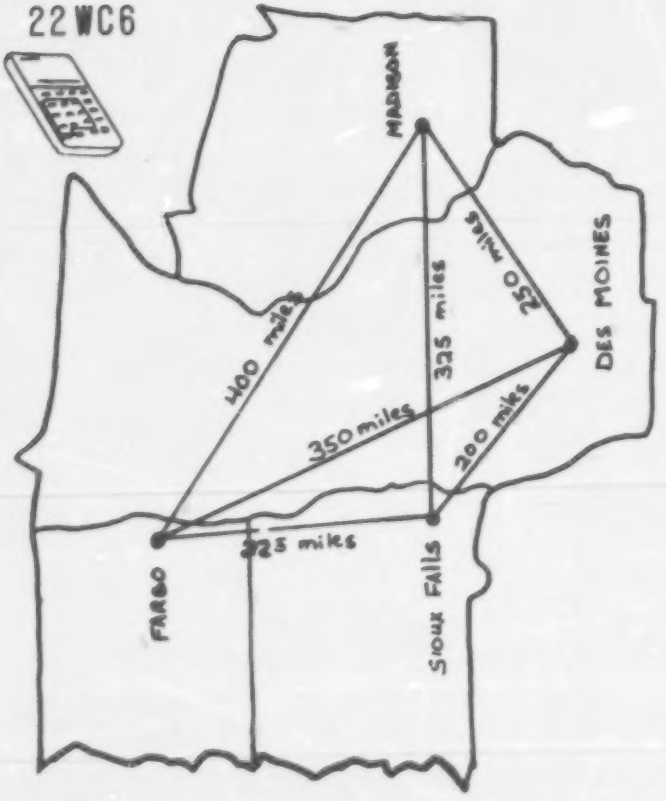
$$\begin{array}{r} 76 \\ 76 \\ +\ 76 \\ \hline 228 \end{array}$$

21WM6

HOW CLOSE ARE WE TO THE CAR UP AHEAD?
WE'RE A SAFE DISTANCE BEHIND. I TRY TO ALLOW ABOUT ONE CAR LENGTH FOR EVERY 10 MILES PER HOUR.

Use the driver's rule. Estimate how many feet is a safe distance between two cars going 50 miles per hour.

22WC6



1. A salesman left Des Moines and flew to each of the other 3 cities. He traveled 800 miles. What was the first and last city he visited?

2. The next week the salesman traveled 825 miles. He left from Des Moines and visited the other 3 cities. What was the first and last city he visited?

21WM6
T

750 to 900 feet is a good estimate.

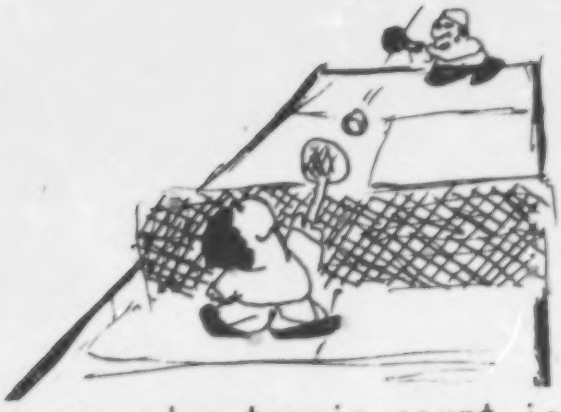
22WC6
T

1. The first city visited was Madison. Fargo was the last city visited.

2. The first city visited was Sioux Falls. Madison was the last city visited.

A team tried different combinations of cities until they found the route that equaled a distance of 800 miles.

23 WV6



The distance around a tennis court is 76 yards. The length of the court is 2 yards more than twice the width. What is the length and width of a tennis court?

24 WM6

1. Estimate how long a chain you and 3 friends can make.
2. How long a chain could be made with 28 students?
3. Estimate how many students are needed to make a chain 100 feet long.

23WV6
T

26 yards long and 12 yards wide.

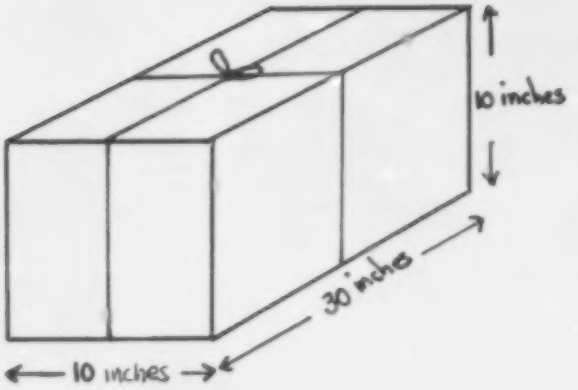
One team found that the length plus the width must be 38 yards because that would be half way around the tennis court. So they listed pairs of numbers that added to 38. Then they multiplied the smaller number by 2 and added 2. When the result was the other number, they knew they had solved the problem.

24WM6
T

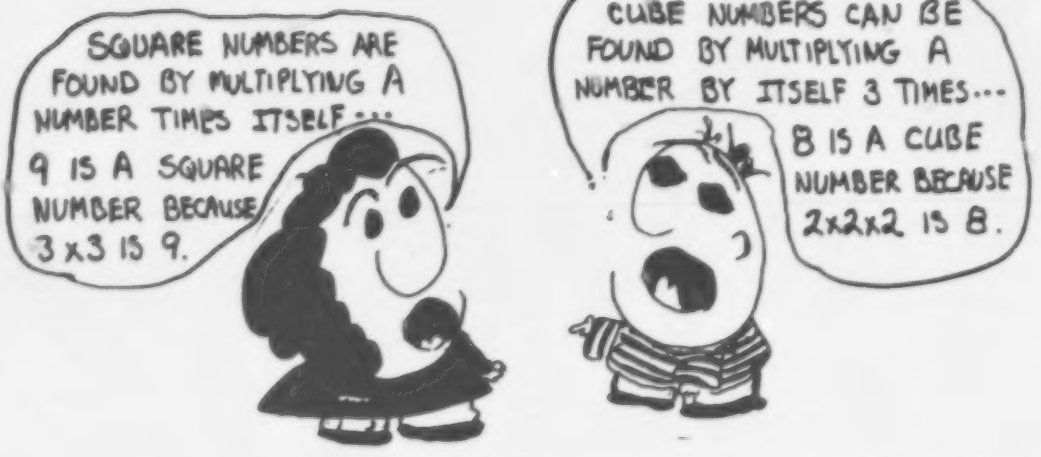
1. 15 to 20 feet
2. 105 to 140 feet would be good estimates.
3. About 20 to 25 students.

25WC6

Estimate how many yards of string you would need to tie 25 of these cardboard boxes.



26 WC6


SQUARE NUMBERS ARE FOUND BY MULTIPLYING A NUMBER TIMES ITSELF...
9 IS A SQUARE NUMBER BECAUSE 3x3 IS 9.
CUBE NUMBERS CAN BE FOUND BY MULTIPLYING A NUMBER BY ITSELF 3 TIMES...
8 IS A CUBE NUMBER BECAUSE 2x2x2 IS 8.

There are 4 numbers that are less than a thousand and they are both square numbers and cubes. Make a list of these numbers.

25WC6
T

84-88 yards is a good estimate

One team figured it will take 120" plus string for the bow to tie the box shown (124"-126" total). So for 25 boxes it will take 3000" plus 100" to 150" for the tie or a total of 3100 to 3150 inches of string or 86 to 87 yards.

26WC6
T

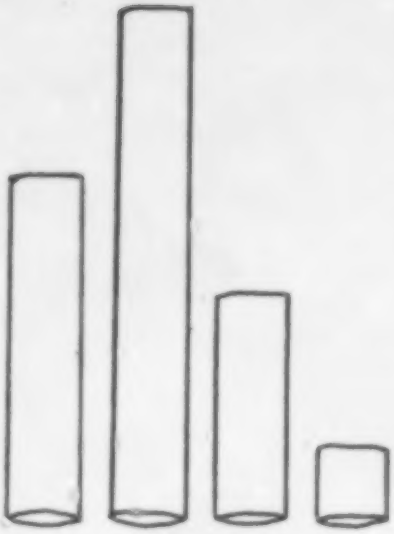
0, 1, 64, and 729

One team picked numbers and then checked their guesses.

Another team listed the square numbers less than 1000 and checked their guesses.

1 RM6

A new piece of chalk weighs about 10 grams. Guess the weight of each of these pieces.



Estimate the weight of these boxes of chalk.

E. Box of 12 whole pieces.
F. Box of 24 half pieces.
G. Box of 60 half pieces.
H. Box of 144 half pieces.

2RC6

How many times can you bounce a ball in one minute? Use your data to answer these questions.

1. How many times could you bounce a ball in a day at your rate?
2. If you bounced a ball day and night for a year, how many times would it bounce?
3. How long would it take you to bounce a ball 1 million times?

1 RM6
T

A. 5 grams
B. 7 to 8 grams
C. 3 to 4 grams
D. 1 gram
E. 120 grams
F. 120 grams
G. 300 grams
H. 720 grams

One team made their estimates by drawing pictures of pieces of chalk. They estimated that 1/3 of a 10 gram piece of chalk was about 3 grams.

2RC6
T

1. 80,000 to 100,000 bounces is a good estimate.
2. 30 to 36 million
3. About 4 months

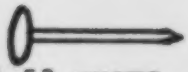
One team estimated they could bounce a ball 60 times in one minute. They built a table to make their other estimates.

Bounces	60	3600	86,400	31,536,000
Time	1 min.	1 hour	1 day	1 year

3RC6

.44 grams

.60 grams



4.53 grams

.09 grams

2.36 grams

5.43 grams

Three of these objects were placed on a scale and the weights are given. You are to name the three objects in each case: tack, paper clip, nail, pin, chalk, marble.

1. 2.89 grams

_____
_____
_____

2. 10.56 grams

_____
_____
_____

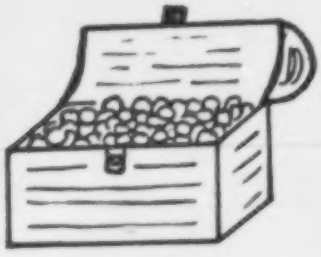
3. 3.05 grams

_____
_____
_____

4. 7.33 grams

_____
_____
_____

4RV6



A pirate stole a treasure chest containing gold coins. He buried 1/2 of them and threw 1/2 of the remaining coins into the sea. If he was left with 5000 gold coins, how many were in the treasure chest that he stole?

3RC6
T

Chalk	2.36g	nail	4.53g
tack	.44	marble	5.43
pin	.09	clip	.60
	2.89		10.56

Chalk	2.36g	nail	4.53
pin	.09	chalk	2.36
clip	.60	tack	.44
	3.05		7.33

4RV6
T

The treasure chest contained 20,000 gold coins.

To find the answer, one team guessed different numbers and computed to see if they would work.

Guess	x 1/2	x 1/2	Number left
10,000	5,000	2,500	2,500
30,000	15,000	7,500	7,500
20,000	10,000	5,000	5,000

6RM6

The bug has crawled 15 centimeters along the path from Point A to Point B. Which direction will the bug be crawling after it has traveled:

1. 35 centimeters from Point A?
2. 55 centimeters from Point A?
3. 75 centimeters from Point A?

5RV6

A bottle and a cork cost 1 dollar and a dime. The bottle costs a dollar more than the cork. How much does each cost?

5RV6
T

The bottle cost $1.05 and the cork cost $.05.

One team tried various combinations of $1.10 until they found one where the difference was exactly one dollar.

Bottle	$1.00	.90	1.03	1.05
Cork	- .10	-.20	- .07	-.05
	$ .90	$.70	$.96	1.00

6RM6
T

1. West
2. East
3. North

One team figured that the outside path was about 10 centimeters in each direction (A to B = 15cm). They estimated that some of the line segments got 1cm shorter as the bug moved toward the center.

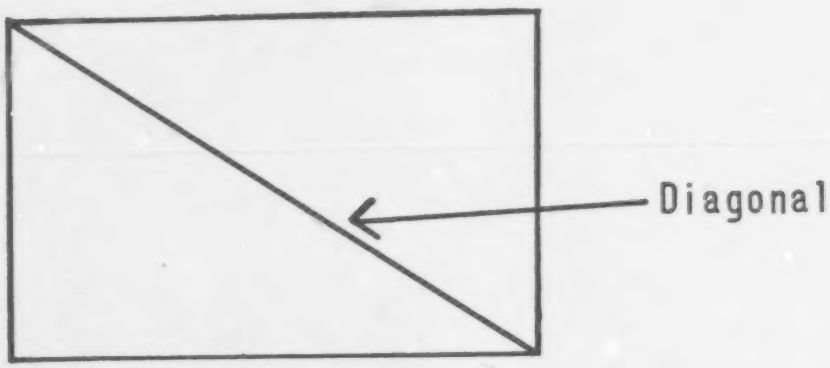
7RC6

1. What are the different remainders when you divide by 3?

2. Guess the different remainders you could get if you divide many different numbers by 5.

3. How many different remainders could you get if you divide many different numbers by 8?

8RD6



The line segment that connects the opposite corners of a rectangle is a diagonal of the rectangle. What are the dimensions of a rectangle that has a diagonal that is 5 centimeters?

7RC6
T

1. 0, 1 and 2 are the different remainders when you divide by 3.
2. 0, 1, 2, 3, and 4
3. 8 different remainders (0, 1, 2, 3, 4, 5, 6, and 7)

8RD6
T

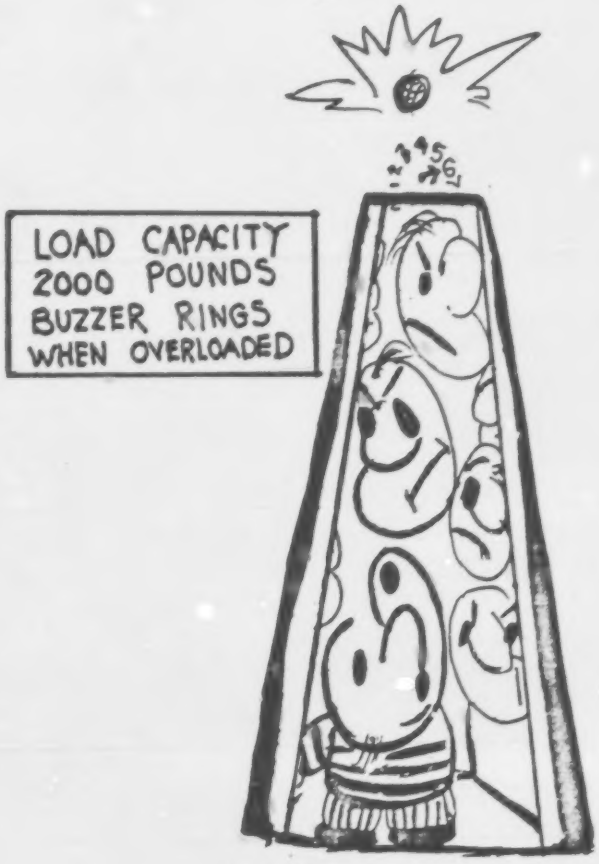
One of the teams drew a 5cm line (diagonal) then fitted a rectangle around it.

Another team drew rectangles and adjusted their drawings until they had a diagonal that was 5cm long.

9RV6

On air flight 297 there is one empty seat for every 5 seats filled. The difference between the number of seats filled and the number of empty seats is 64. How many passengers are there on the plane?

10RM6



The elevator door opens. It's full of adults. You step in and the buzzer rings. Estimate the number of adults in the elevator.

9RV6
T

80 Passengers

One team recorded their thinking this way:

Filled	Empty	Difference
5	1	4
10	2	8
20	4	16
40	8	32
80	16	64

10RM6
T

10-14 adults

One team thought that adults weigh about 150 pounds. They built a table and estimated that there were 13 adults in the elevator.

Adults	1	2	4	10	14
Weight	150	300	600	1500	2100

Another team estimated that adults weigh 170 pounds and divided 2000 by 170. They thought there were about 11 adults in the elevator.

11RV6

1. How many pecan pies were sold?
2. How many blueberry pies were sold?

12RV6

I bought 3 cans of dog food at 39 cents a can and 5 cans of soup. I received $2.68 change from a 5 dollar bill. What was the cost of each can of soup?

11RV6
T

1. 18 Pecan Pies
2. 12 Blueberry Pies

One team made the following list to determine their answer.

30 Pies	
Pecan	Blueberry
15	15
16	14
17	13
18	12

Solution!

12RV6
T

23¢

One team thought this way:
"3 cans of dog food at 39¢ is $1.17. Subtract this amount and his change from $5.00 and you should get the cost of the five cans of soup. The cost of the soup is $1.15 so each can must cost 23¢."

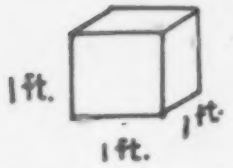
Another team thought this way;

3 cans of dog food ------- $1.17
5 cans of soup---------- [?]
change ---------- 2.68
5.00

add

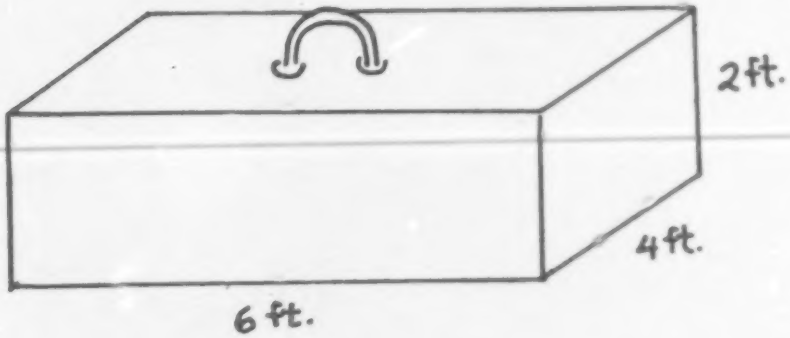
[?] = 5.00 - 1.17 - 2.68

13RM6



One cubic foot of granite rock weighs 180 pounds.

Use this information to estimate the weight of this rock used to moor a boat.



14 RV6

Martha is 50 years older than John. In 9 years she will be twice John's age. How old are they now?

13RM6
T

8,640 pounds

One team drew the moor and sectioned it into cubic feet. They found the moor had 48 cubic feet and multiplied that number by 180 pounds.

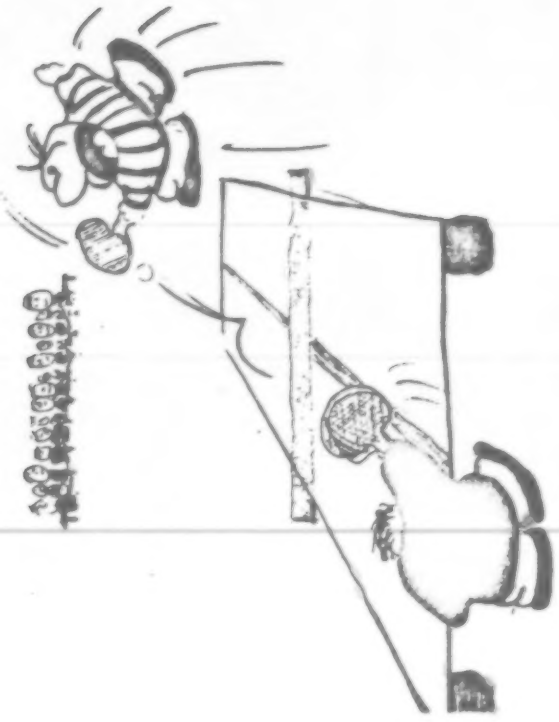
14RV6
T

John 41 yrs. old
Martha 91 yrs. old

One team made this table to record their guesses.

John	Martha	John + 9	Martha + 9
30	80	39	89
40	90	49	99
41	91	50	100

15 RD6



16 students have entered a ping pong tournament.

If each student must play until he loses one game, how many games must be played?

16 RC6

The game of Zwei is played with 2 players. How many games could be played at the same time if 209 persons could play? How many of the 209 persons would have to watch?

The game of Drei is played with 3 players. How many games could be played at the same time if 209 persons could play? How many of the 209 persons would have to watch?

The game of Funf is played with 5 players. How many games could be played at the same time if 209 persons could play? How many of the 209 persons would have to watch?

The game of Sieben is played with 7 players. How many games could be played at the same time if 209 persons could play? How many of the 209 persons would have to watch?

15RD6
T

15 games must be played if a player is "out" after losing once.

One team thought of the players as A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P (16 letters). They imagined games being played and crossed off a letter to show when a player lost. They imagined playing games and crossed off letters until only one (the winner) was left. They counted and found 15 games had been played.

16RC6
T

Zwei -- 104 games (208 players); 1 must watch.

Drei -- 69 games (207 players); 2 must watch.

Funf -- 41 games (205 players); 4 must watch.

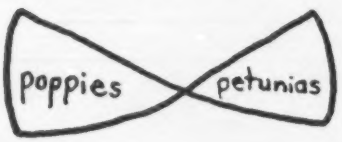
Sieben -- 29 games (203 players); 6 must watch.

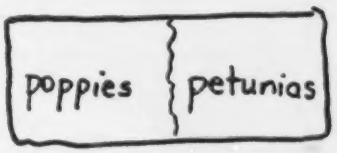
17 RD6

A father and his two sons wish to cross a river in a boat, but the boat will only carry 200 pounds at a time. If the father weighs 200 pounds and his sons weigh 100 pounds each, how can they cross the river in the boat?

18 RD6

1. Mrs. Plough planted poppies and petunias in a plot so they shared a boundary. Which of these is Mrs. Plough's plot? (A point is not a boundary.)





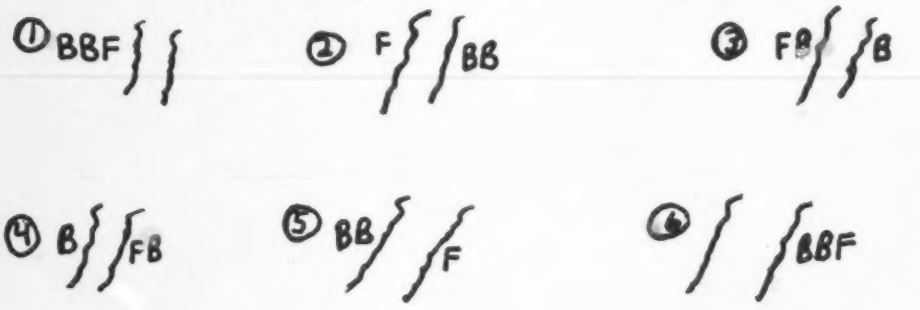
2. Mr. Gardner wanted to plant gardenias, geraniums, and gladiolas. Show how he could plant the flowers so the gardenias are next to the geraniums, but the geraniums are not next to the gladiolas.

3. Show how Mr. Gardner could plant the flowers so each type is next to each of the other two types.

17RD6
T

The 2 boys cross together. One stays and the other returns. Then the father crosses alone and the boy returns. Finally both boys cross together.

One team drew a diagram to picture the answer:



Another team took slips of paper marked boy boy father They moved the slips across an imaginery river until they understood how to solve the problem.

18RD6
T

1. Poppies | Petunias

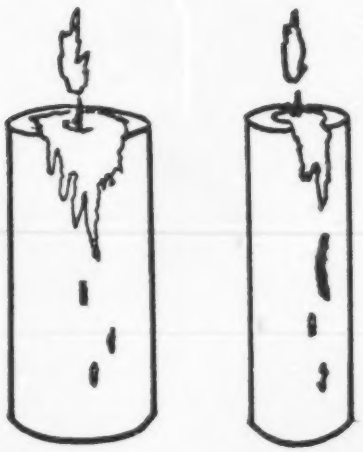
2. Geraniums | Gardenias | Gladiolas

3. Geraniums
   Gardenias | Gladiolas

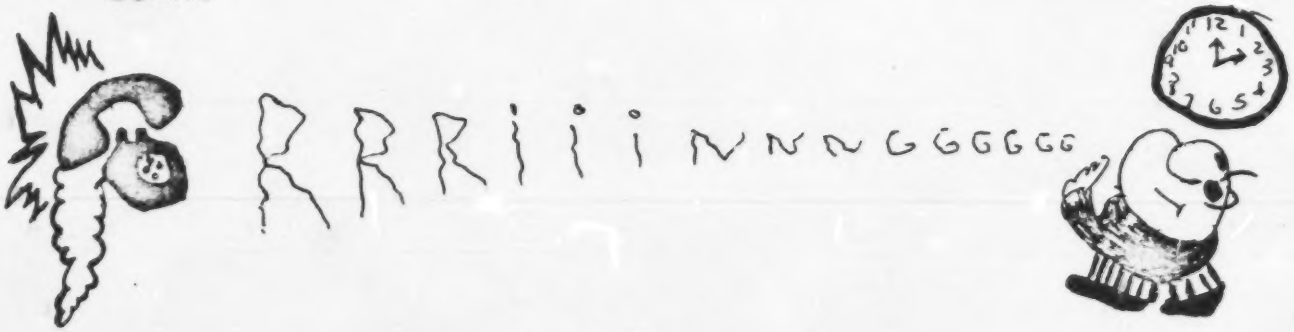
One team solved the problem by drawing pictures of the flower gardens. Then they read the problem again and decided if the picture was a correct answer.

19 RD6

Two candles of equal length are lit at the same time. One candle takes 6 hours and the other 3 hours to burn out. After how much time will the slower burning candle be exactly twice as long as the faster burning one?



20RM6

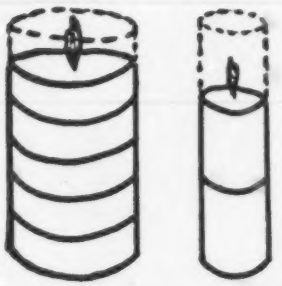


1. Find out how many times the phone rings in 10 seconds.
2. Estimate how long a ring is.
3. Estimate how long the pause is in between each ring.

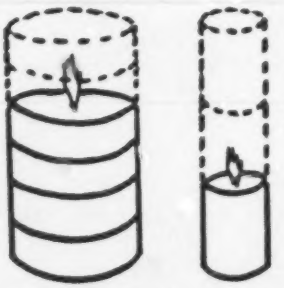
19RD6
T 2 Hours.

One team drew pictures of the two candles to show how much would be left after one hour, after two hours, after three hours.

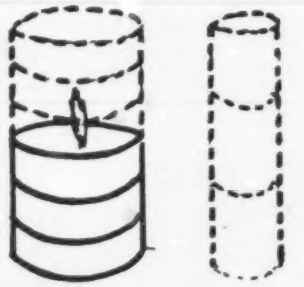
After One Hour



After Two Hours



After Three Hours



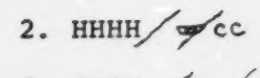
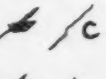
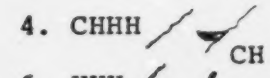
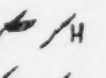
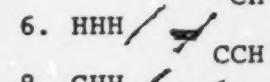
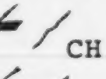
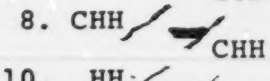
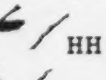
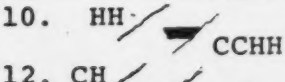
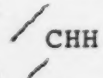
They saw that after two hours 4/6 of the big candle was left and 1/3 of the little candle was left. 4/6 is twice as big as 1/3.

20RM6
T

1. 3 or 4 times
2. A ring is about one second long
3. The pause is about two seconds long.

One team listened to a phone ringing and collected their data.

21RD6
T

1. CCHHHH
2. HHHH 
3. CHHHH 
4. CHHH 
5. CCHHH 
6. HHH 
7. CHHH 
8. CHH 
9. CCHH 
10. HH 
11. CHH 
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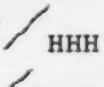
13. CCH 
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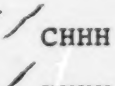
15. CH 
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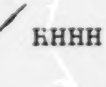
17. CC 

22RM6
T

10 gallons.

To check their guess one team got a faucet to drip 18 times in 10 seconds. They put a measuring cup under it and found the cup was filled in 10 minutes. Then they made this table.

Time	10 min.	1 hr.	1 hr.	24 hrs.	24 hr.	24 hrs.
Water	1 cup	6 cups	3 pts.	72 pts.	36 qts.	9 gal.

Another team checked their guess by getting a faucet to drip 18 times in 10 seconds. Then they let the faucet drip into a container for 30 minutes. The container had one quart of water in it after 30 minutes. Then they made this table.

Time	30 min.	1 hr.	2 hrs.	2 hrs.	24 hrs.
Water	1 qt.	2 qts.	4 qts.	1 gal.	12 gal.

21RD6

Four hikers came to a wide river. The only way they could cross the river was in a small boat owned by two children. The boat would hold both children or one hiker. It would not hold a hiker and a child and it would not hold two hikers. How did the hikers cross the river using only the boat?

22 RM6

If a water faucet drips 18 drips in 10 seconds, how much water will be lost in 24 hours? Which of these <u>guesses</u> would you choose?

1 gallon 10 gallons

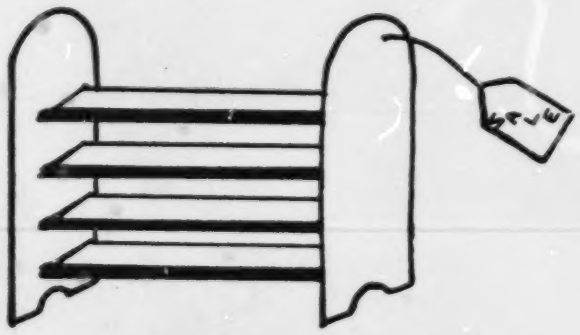
100 gallons 1000 gallons

23RC6

Your dad plants corn in rows that are 30 inches apart. How many rows can he plant in a field that is 375 feet wide?

24RD6

A furniture dealer bought a bookcase for $35.00 and sold it for $40.00. Then he repurchased it for $30.00. He then sold it again for $35.00. How much profit did he make -- $5.00, $10.00, $15.00?



23RC6
T 150 or 151 rows

One team made this table.

Feet	2½	5	25	100	300	75	375
Rows	1	2	10	40	120	30	150

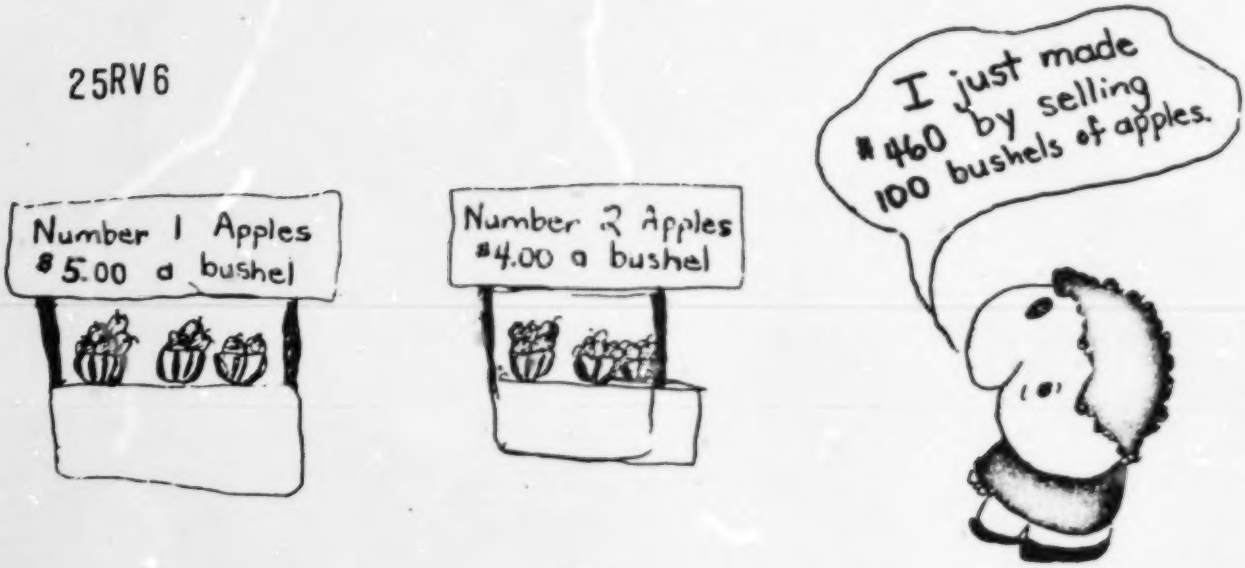
There could be 150 or 151 rows.

If the rows start at the very edge of the field there are 151 rows. Otherwise there are 150 rows.

24RD6
T $10.00

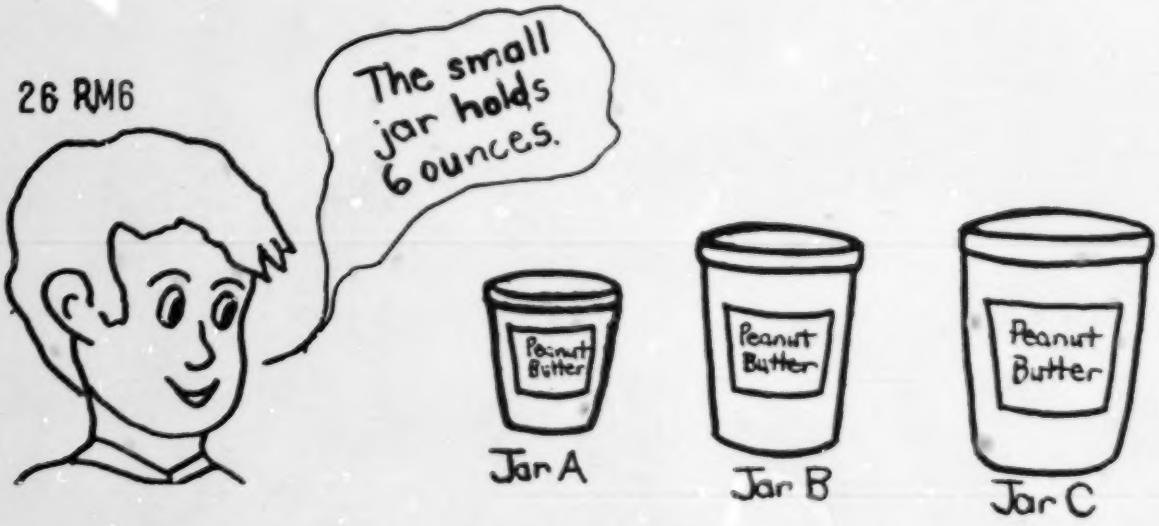
He made $5.00 on the first sale and $5.00 on the second sale.

25RV6



How many bushels of number 1 and number 2 apples did he sell?

26 RM6



Estimate how many ounces each of the other two jars hold.

25RV6
T

60 bu. of #1 apples (and 40 bu. of #2 apples)

One team made guesses and put them in a table until they found one that worked.

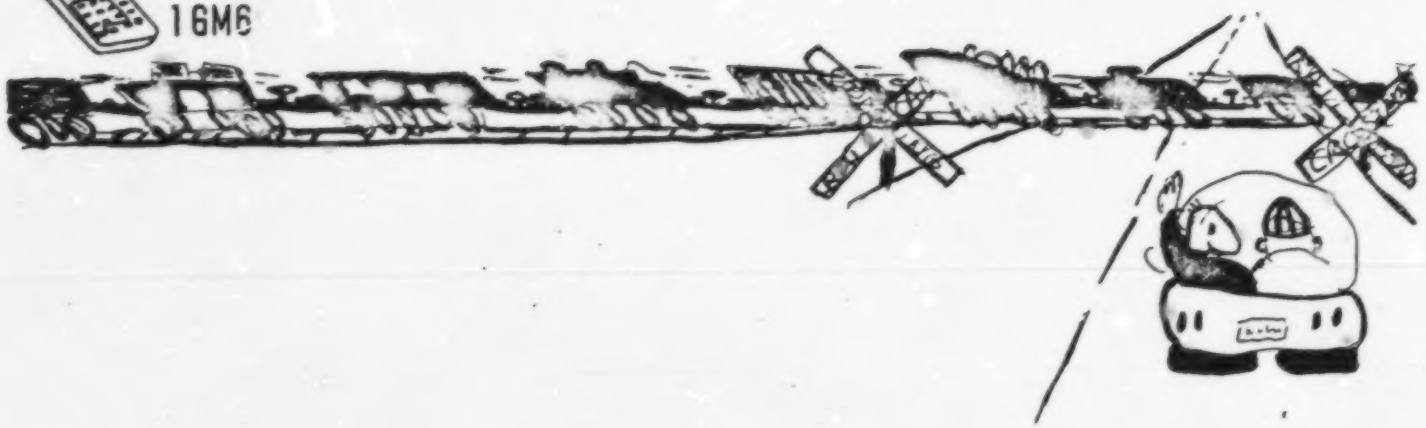
#1	#2	value
10	90	$410
30	70	430
50	50	450
60	40	460

26RM6
T

Jar B 12 Ounces

Jar C 20 Ounces

16M6



You are counting railroad cars. 14 railroad cars go by in 1 minute. Railroad cars are about 70 feet long. Estimate the speed of the moving train in miles per hour.

26C6

Your classroom is a big box.

1. Make an estimate for the dimensions of your classroom.

   Length (ℓ) ____meters
   Width (w) ____meters
   Height (h) ____meters

2. Use your estimates to estimate the total surface area of your room.

   Surface Area = $2\ell \times w + 2w \times h + 2\ell \times h$
   Surface Area ____square meters.

3. Estimate the volume of your classroom.

   Volume = $\ell \times w \times h$
   Volume _____

1GM6
T

About 12 miles per hour.

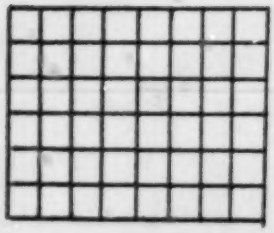
One team multiplied 14 times 70. They estimated the train was moving about 1000 feet a minute or 60,000 feet in 1 hour (60 minutes). They estimated that 60,000 feet per hour was about 12 miles per hour.

2GC6
T

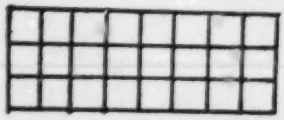
The students' estimates of surface area and volume are dependent on their estimates of the classroom dimensions.

1. One team found that two of their steps were about 1 meter. They stepped off the length and width and then estimated the height.

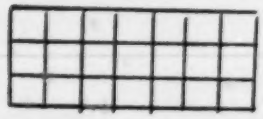
2. To determine the surface area and volume, one team used the formulas. Another team used drawings. They estimated the surface area by counting squares.



floor and ceiling



2 long walls

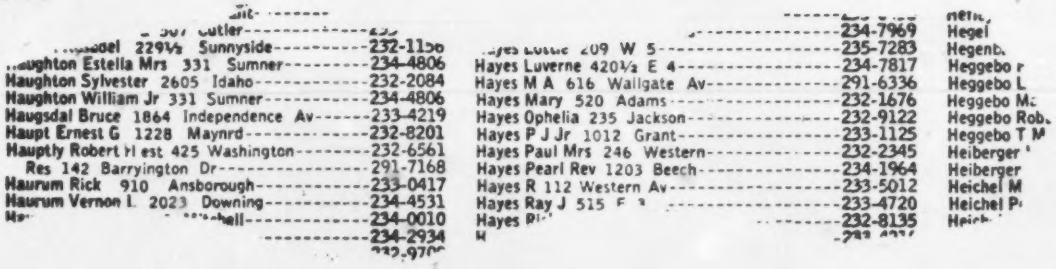


2 short walls

36D6

Make a sequence with nine dots like the ones above on your paper. Cross all the dots with 4 straight lines without lifting your pencil.

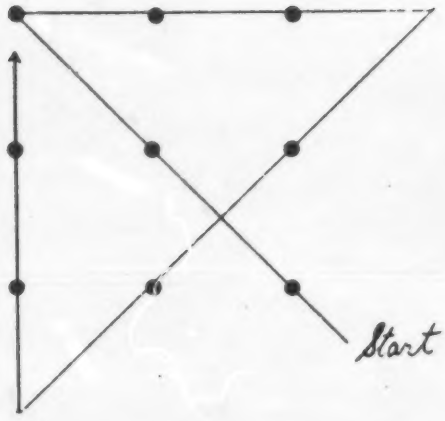
46M6



Find a telephone book.

1. How many phone numbers are on a page?
2. How many phone numbers are in your book?
3. If there are 1,000,000 phone numbers in a Chicago phone book, how many pages would it take to list them?

3GD6
T



There are other ways to do it.

4GM6
T

1. The students will randomly select a page from the phone book and count the numbers on that page. For a 9" x 11" phone book, a good estimate is 275 to 300 numbers per page.

2. The students multiplied the number of phones per page by the number of pages in the book.

3. 3,333 pages (This answer will depend on the data collected in the previous problems.)

5GC6

One turn of a car wheel moves the car ahead about 6 feet. A tire manufacturer guarantees a tire for 40,000 miles. Estimate how many turns of the tire are guaranteed by the manufacturer.

6GV6

Lou weighed 5 kilograms more than Len. If Len weighed twice as much as he does now, then he would weigh 20 kilograms more than Lou. How much does each person weigh?

5GC6
T

36,000,000 turns of the tire is a good estimate.

One team divided 5280 (feet in a mile) by 6 and estimated a car wheel would make 900 turns in one mile. They thought the manufacturer guaranteed 900 x 40,000 or about 36,000,000 turns of the tire.

6GV6
T

Lou 15 kg Len 10 kg

One team made this table to record their guess.

Lou	x2	Len	Difference
6	12	6 - 5 = 1	12 - 1 = 11
10	20	10 - 5 = 5	20 - 5 = 15
20	40	20 - 5 = 15	40 - 15 = 25
15	30	15 - 5 = 10	30 - 10 = 20

76M6

About how long is a lima bean? Use your estimate to answer these questions.

1. How many lima beans would make a line across your desk if your desk is 60 centimeters across?
2. How many lima beans would it take end to end to go across your classroom if the classroom is about 10 meters wide?
3. How long a line could you make with 10,000 beans end to end?
4. If there are about 1,200 beans in a pound, how many pounds of beans would you need to go 1 mile (about 1600 meters)?

86C6

PERFECT SQUARES

1
4
9
16

4 is a perfect square because 2 x 2 = 4

25 is a perfect square because 5 x 5 = 25

81 is a perfect square because 9 x 9 = 81

What number can you add to both 100 and 164 to get two perfect squares?

7GM6
T

1. 60 beans
   Most teams estimated a lima bean to be one centimeter long.

2. 1000 beans

3. 10,000 cm or 100 m

4. One team estimated that 1,200 beans would go 1,200 centimeters or 12 meters. In 1 mile (1600 meters) they estimated they would need about 133 pounds.

Something Else to Try:

About six miles.

8GC6
T

125

One team made guesses that would make 100 plus the guess a perfect square and then checked it for 164.

100 + 21 = 121(11 x 11)	164 + 21 = 185
100 + 44 = 144(12 x 12)	164 + 44 = 208
100 + 69 = 169(13 x 13)	164 + 69 = 233
100 + 96 = 196(14 x 14)	164 + 96 = 260
100 + 125 = 225(15 x 15)	164 + 125 = 289(17 x 17)

96D6

Assume that a person can carry 4 days' supply of food and water for a trip across a desert which takes 6 days to cross. One person cannot make the trip alone because the food and water would be used after 4 days. How many persons would have to start out in order for one person to get across and for the others to get back to the starting point?

106V6

Mary gave a puzzle to Ed to solve. She said, "I spent 66¢ and bought 3 gizzies and 2 fizzies. If I had bought 2 gizzies and 3 fizzies I would have needed two cents less. How much does a gizzy cost?" Ed solved the problem in two days. Can you solve it?

9GD6
T

3 Persons Must Start.

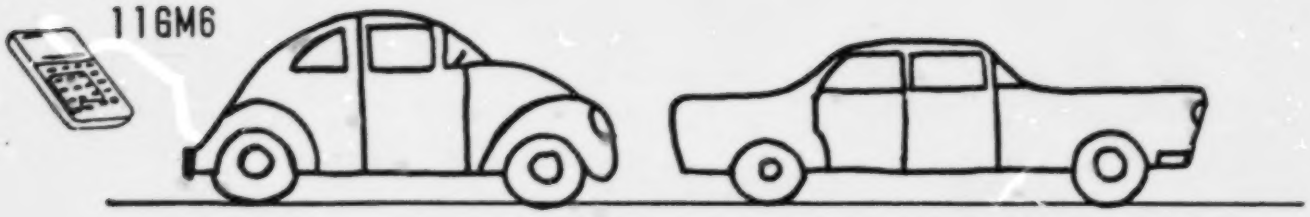
One team organized its thinking in this table. The persons are called A, B, and C. The numbers show the amount of food supply. The arrows show the direction they're going.

	Day 1		Day 2		Day 3		Day 4		Day 5		Day 6	
	Begin	End	Begin	End	Begin	End	Begin	End	Begin	End	Begin	End
A	4 →	3	4 →	3	4 →	3	3 →	2	2 →	1	1 →	0
B	4 →	3	4 →	3	2 ←	1	1 ←	0 Home				
C	4 →	3	1 ←	0 Home								

10GV6
T

14 cents for a gizzy (and 12¢ for a fizzy)

116M6



A small car is about 15 feet long and a large car is about 18 feet long. Use this information to estimate an answer to these.

1. How many large cars can be parked bumper to bumper in 300 feet? (About one block)

2. How many small cars can be parked bumper to bumper in 300 feet?

3. A line on the toll way was bumper to bumper for 3 miles. About how many cars were on that section of the tollway?

126C6

Railroad ties are 18 inches apart. If the railroad track from New York to San Francisco is 3000 miles, how many ties would it take?

11GM6
T

1. 16 cars is a good estimate
2. 20 cars
3. Between 880 and 1056

One team used their estimates in parts 1 and 2 to estimate that 18 cars could be lined up bumper to bumper in 300 feet.

Using 15000 feet to be about 3 miles, they thought:

300 feet = 18 cars
15000 feet = 900 cars

Something Else to Try

The team estimated that 1 small and 1 large car parked bumper to bumper would make a line 33 feet long. They built a table:

Cars	2	100	100,000,000
Length (feet)	33	1650	1,650,000,000

12GC6
T

10,560,000 Ties

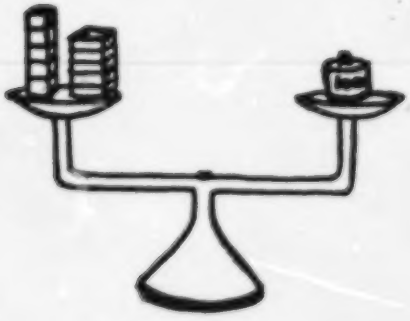
This assumes it is 18 inches from the center of one tie to the center of the next tie.

136D6

Three explorers and three cannibals had to cross a river in a small boat. The boat would carry only two persons at a time. Knowning the habits of the cannibals, the explorers knew that if there were ever more cannibals than explorers on one side of the river, they would get eaten. Only one of the explorers and one of the cannibals could row. How did they manage to get across the river?

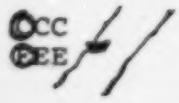
146V6

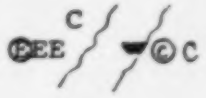
Chris found that 5 norks and 5 plorbs weigh 100 grams. Terrie found that 6 norks and 2 plorbs weigh 100 grams. What do 10 norks and 10 plorbs weigh? How can Chris and Terrie find the weight of one nork?

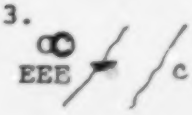


13GD6
T

The circled letters indicate the rowers.

1. 

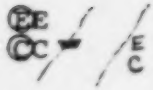
2. 

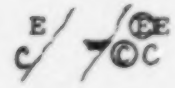
3. 

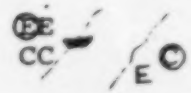
4.

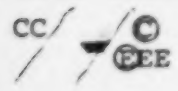
5.

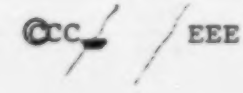
6.

7. 

8. 

9. 

10. 

11. 

12.

13.

14.

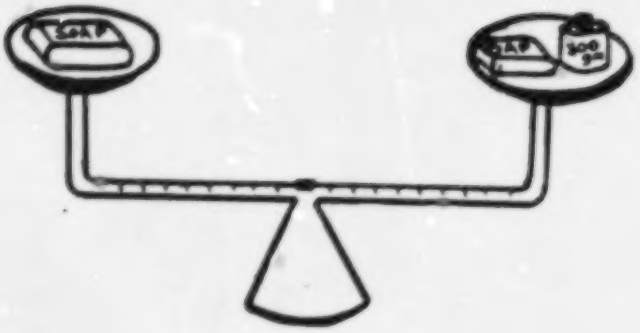
14GV6
T

10 norks + 10 plorbs weigh 200 grams.
30 norks + 10 plorbs weigh 500 grams.

20 norks must weigh 300 grams.

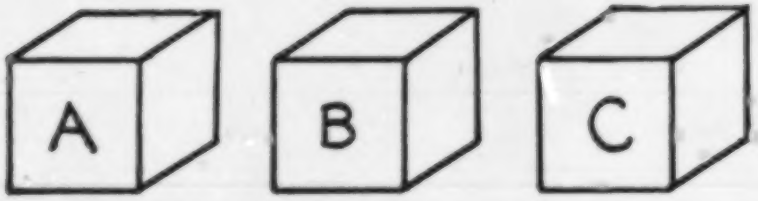
Each nork weighs 15 grams.

156C6



If you place 1 bar of soap on a pan of a scales and 3/4 of a bar of soap and a 300 gram weight on the other, the pans balance. How much does the bar of soap weigh?

166V6



Use this information to determine how many beans are in these boxes. The sum of the number of beans in A and B is 385. The difference between the number of beans in B and C is 65. The sum of the number of beans in A and C is 320. The difference between the number of beans in A and C is 70.

15GC6
T

1200 grams.

One team thought this way:

"300 grams must be equal to 1/4 of the bar of soap.

Therefore, 4 times 300 should be the weight of the soap,

4 x 300 = 1200."

16GV6
T

A has 195. B has 190. C has 125.

One team organized their guesses in a table. They first guessed A had 100 beans.

A	B	C	
100	285	220	But 100 - 220 ≠ 70, So they
200	185	120	guessed A had 200. But 200 - 120 ≠ 70
190	195	130	So they guessed A had 190. But 190 - 125 ≠ 70.
195	190	125	So they guessed A had 195. 195 - 125 = 70

Another team looked for two numbers that added to 320 and differed by 70. These numbers (195 and 125) were the number of beans in A and C. Then they found that B has 190 beans.

17 6C6

A restaurant, famous for its rolls, doesn't charge for them if the diner eats a reasonable number. There is a charge, however, for each roll eaten above the magic number. A husband and wife who loved the crispy rolls, together consumed 13 and were charged 60 cents. Had one person eaten them, the charge would have been $1.60.
How many rolls can a person eat without being charged?

186D6

You can cut a pie into 7 pieces with only three straight cuts. What is the largest number of pieces you can make with 5 cuts?

17GC6
T

5 free rolls each

One team organized its thinking this way.
First they guessed each person got 6 free rolls.
Two persons would get 12 free rolls and have to pay for only 1 roll. That roll cost 60¢. If one person ate 13 rolls (6 free), 7 would have to be paid for. Then would cost $4.20, not $1.60.

Next the team guessed each person got 4 free rolls and then tested their guess.

	Number of free rolls each person	Number to pay for	cost of rolls
(2 people)	6 guess	1	60¢ check
(1 person)	6	7	(7 x .60 = $4.20)
(2 people)	4 guess	5	12¢ check
(1 person)	4	9	(9 x .12 = $1.08)
(2 people)	5 guess	3	20¢ check
(1 person)	5	8	(8 x .20 = 1.60)

18GD6
T

16 pieces.

One team drew a picture and counted the pieces.

Another team made a list and looked for a pattern.

Number of cuts	Number of pieces	
0	1	
1	2	(1 more added)
2	4	(2 more added)
3	7	(3 more added)
4	11	(4 more added)
5	16	(5 more added)

196M6

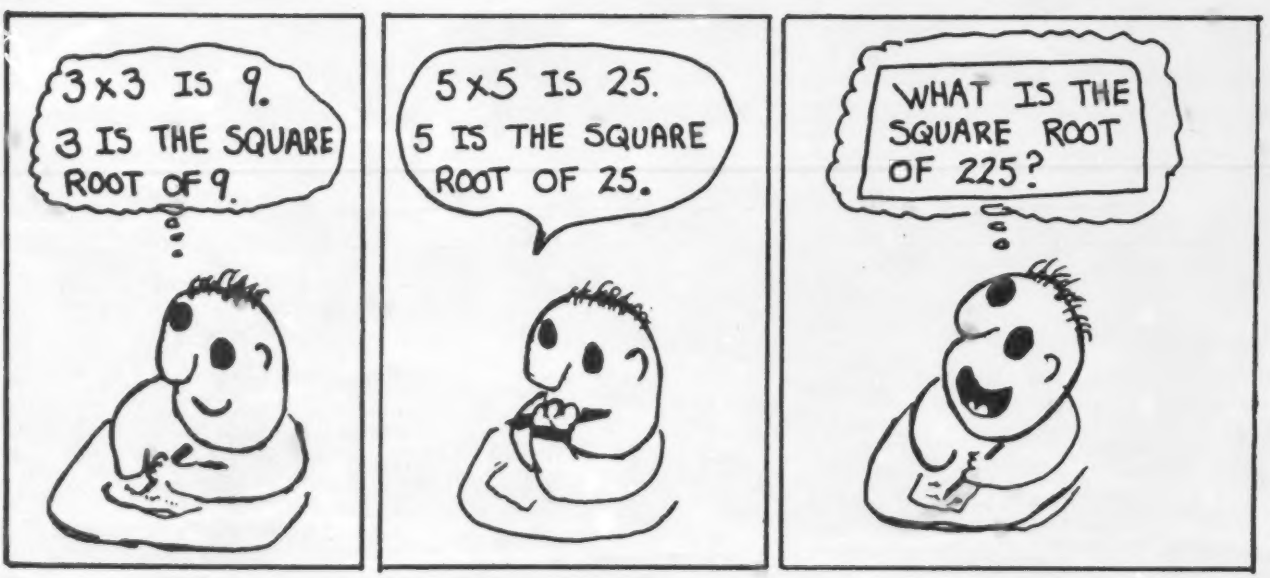
How high is an airplane?

1. You are a passenger on an airplane. The pilot says you are flying at 32,000 feet. Estimate how many miles high you are flying?

2. You look out the window and estimate that it takes you about 5 seconds to fly from one road to the next, which you know is about a mile. How many miles per hour is the plane traveling?

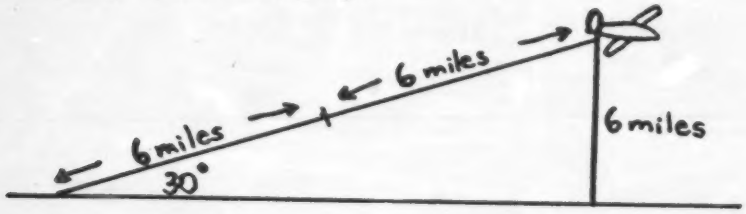
3. The plane took off at an angle of 30 degrees. How far at that angle will the plane fly before it reaches its cruising elevation of 32,000 feet?

206C6



19GM6
T

1. 6 miles high is a good estimate.
2. 720 miles per hour is a good estimate. One team thought this way: 1 mile in 5 seconds is 12 miles in 1 minute. 12 miles in 1 minute is 720 miles in 1 hour.
3. One team made this drawing:



They used their drawing to estimate that the plane would travel 12 miles.

20GC6
T

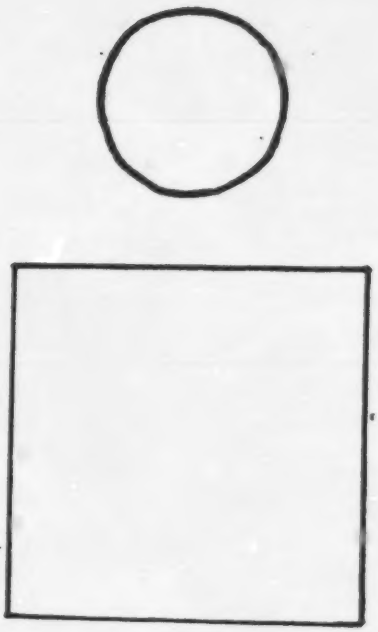
15 is the square root of 225

One team multiplied to find the square root of 225. They made a list like this:

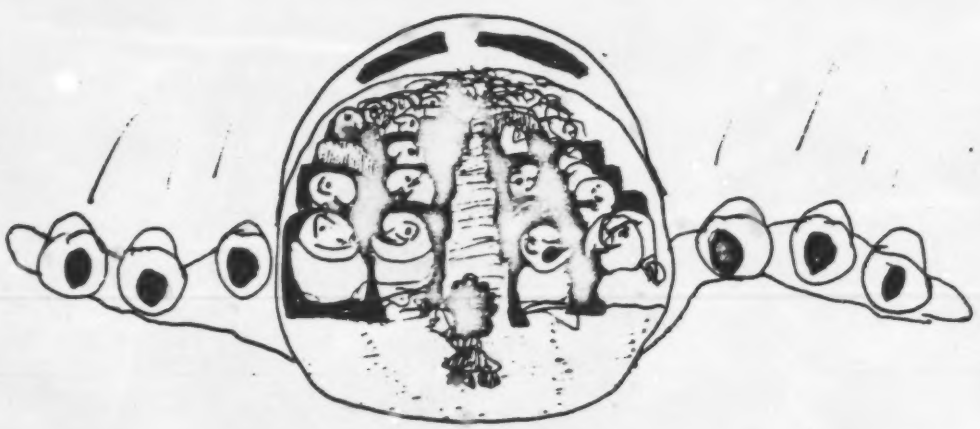
10 x 10 = 100
11 x 11 = 121
12 x 12 = 144
13 x 13 = 169
14 x 14 = 196
15 x 15 = 225

216D6

What is the fewest number of circles you can draw that have a 1 inch diameter that will completely cover a square that is 2 inches on a side?



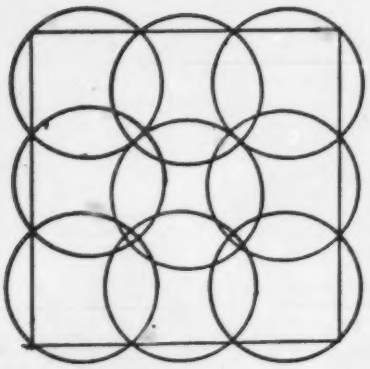
226V6



The flight attendant counted 70 passenger tickets. She noted that there were 2 empty seats for every 9 passengers and said there must be two people on the plane without tickets. How many passengers will the plane hold?

21GD6
T

Nine.



22GV6
T

The plane will hold 88 passengers

One team realized there were 72 passengers on the plane.

They built a table to find the number of empty seats.

Empty Seats	2	16
Passengers	9	72

They decided the airplane could hold 16 + 72 or 88 passengers.

236M6

A bicycle travels about 7 feet forward for each turn of the wheel.

1. About how many times does it turn in a mile? The mileage on the odometer on your bike shows 583 miles.

2. About how many times did the wheel turn during the 583 miles?

246M6

If you stacked 19 billion hamburgers, how high would the stack be?

23GM6
T

1. A wheel turns 750 to 755 times in a mile.
2. About 440,000 times.

One team thought this way:

Turn of Wheel	Feet Forward
1	7
10	70
100	700
700 → (750)	4900 → (5250)
800	5600

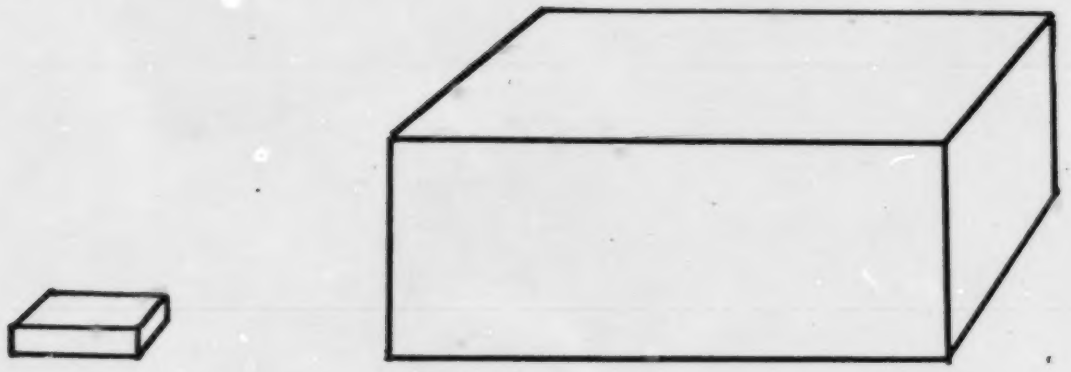
Another team divided 5,280 feet by 7 feet and computed to solve the problem.

24GM6
T

19,000,000,000 hamburgers → 19,000,000,000 inches
→ 1,583,333,333 feet
→ 299,813 miles

One team found the height of the stack in inches, then feet (by dividing by 12), then miles (by dividing by 5280).

256D6

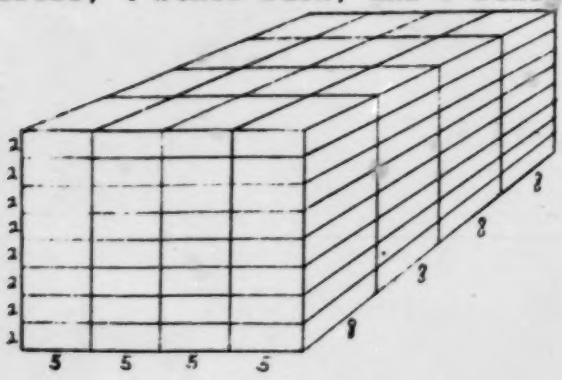


How many boxes 5 cm by 8 cm by 2 cm can you put in a box that is 20 cm by 32 cm by 16 cm?

25GD6
T

128 boxes

One team drew a picture and saw they could stack 4 boxes across, 4 boxes back, and 8 boxes high.



4 x 4 x 8 = 128 boxes